APR 25 1918
UNIV. OF MICH. LIBRARY

GAS JOURNAL

LIGHT ♦ HEAT ♦ POWER ♦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXLI. No. 2863.] LONDON, MARCH 26, 1918. [70th Year. Price 6d.

O'NEILL'S
OXIDE
GAS PURIFICATION
AND
CHEMICAL Co., Ltd.
PALMERSTON HOUSE, LONDON, E.C.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, L.D.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 24.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT
STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.
STOCKTON-ON-TEES.
Complete
GAS WORKS
London Office
32, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED
— 1861 —
Telegrams:
"DRY METERS, LONDON."
Telephone:
KENSINGTON, 1140.

George Glover
and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving George Glover and Co.'s works, Irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

Every Mantle manufactured and supplied by the Welsbach Light Co., Ltd., is

BRITISH MADE

by British labour at the Welsbach Factory at Wandsworth, London, S.W. 18.

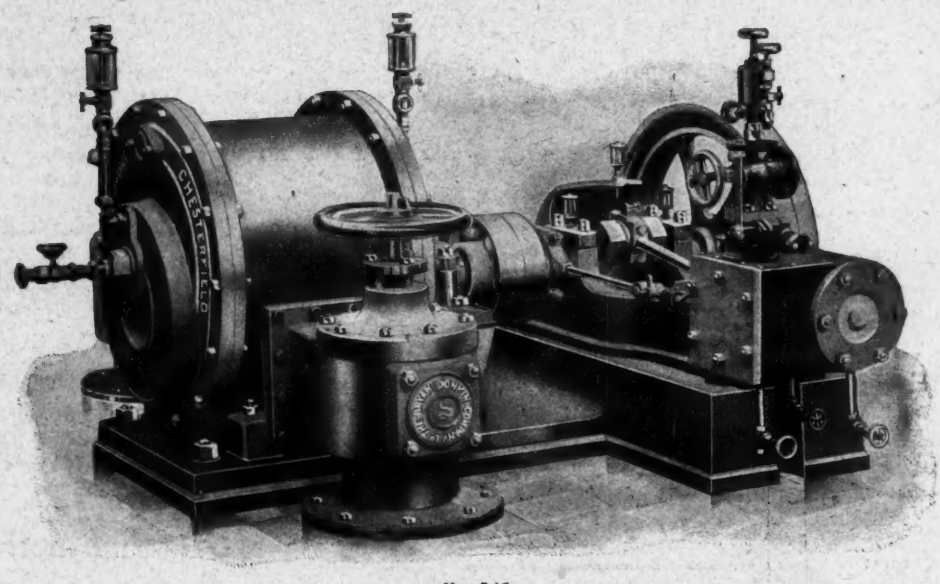
Welsbach Mantles have stood the test for well over a quarter of a century, and to-day are in greater demand than ever —a proof of their reliability.

THE ORIGINAL AND STILL THE BEST

The WELSBACH LIGHT CO. Ltd., Welsbach House, King's Cross, W.C. 1.

And at Birmingham, Bristol, Dublin, Hull, Leeds, Manchester, and Stoke - on - Trent.

GAS EXHAUSTING PLANT.



No. 546.

View of Gas Exhauster combined with "C" Type Horizontal Steam Engine on the same Cast-Iron Baseplate.
This shows one of a standard type of plant supplied by us, where an Exhauster of medium capacity driven by Steam Engine is required.
We have recently introduced a system of Automatic Lubrication, which ensures an Exhauster being continuously and adequately lubricated with a minimum of attention.

Makers also of ROTARY COMPRESSORS for High-Pressure Gas Distribution for pressures up to 20 lbs. per square inch.

VALVES OF ALL TYPES AND SIZES. TAR, LIQUOR, AND WATER PUMPS. COMBINED METER-BLOWERS FOR OXIDE REVIVIFICATION.

THE BRYAN DONKIN CO., Ld., CHESTERFIELD.

Head Offices and Works: CHESTERFIELD.
LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.
Chesterfield Telephone No. 34.
London Telephone No. 5268 Victoria.
Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin, Vic. London."

1918.

ch.

.

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLI., No. 2863] TUESDAY, MARCH 26, 1918. [70TH YEAR.

EDITORIAL NOTES.

The Board of Trade and the "Financial Hardships" Bills.

THE statement by the President of the Board of Trade (Sir Albert Stanley), in the House last Wednesday, leaves the situation of the Gas Bills unchanged for the time being; but the statement in respect of some of the promoting companies makes the case for revision, under war conditions, stronger than before. The speech was a candid one. It shows that the Board of Trade are sympathetic over the unenviable position of stock and share holders in gas companies who have been heavily hit by the war; and behind their sympathy one discerns the view that the capital employed in this public service ought, as in other enterprises, to receive a fair, though not extravagant, remuneration under the circumstances in which it has been placed, through altogether external and exceptional conditions. This indirectly Sir Albert admits. He told the House that the Board recognize that the prescriptions governing gas prices and dividends were fixed in normal times, and no provision was made for abnormal times; and he agrees as to the necessity for dealing with the situation. This is practically at present the sum of the admission of the Board. But so far it is good; and in this plain speaking the opposing local authorities will find no good-boding for their hostility. They will see in it that, at all events, the Board of Trade appreciate—if they and their advisers cannot—that capital has a claim to justice.

Beyond this there is not much in the speech that directly bears upon the purpose of the Bills, except that Sir Albert believes that certain changes which he foreshadowed in regard to coal supplies and gas and electricity rationing will materially further affect the businesses of most gas and electricity companies. These changes are dealt with in the succeeding article. But what is at the back of the minds of the Board as to the method of dealing with the Bills may, we think, be reasonably extracted from what the President said. It is plain that they are fully convinced that there is no case for any general relaxation of the statutory requirements, and that the merits of each case must be separately considered. Of course, this can be attained by the ordinary process of individual Private Bills and Provisional Orders; but this would be altogether a clumsy and not a uniformly effective method. It would be far better to have a means of making applications to one tribunal empowered by Parliament to deal with the matter; and, as the Standard of Calorific Power Act has shown, gas undertakings could not have a better tribunal than the Board of Trade. They have the grip of this matter; and their consideration of each case would enable them to adjudicate more freely, through the intimate knowledge gained, upon succeeding applications than would be possible by Parliamentary Committees, varying in their constitution and knowledge of the subject. We interpret this as the view of the Board from the remarks made by the President when referring to the alternative to the promotion of Private Bills. The alternative, he said, would be a General Bill which would place upon a Government Department the responsibility and the duty of considering the merits of each application and making Orders, if it should be found necessary and desirable. But the Board have been reluctant to assume the responsibility of bringing in a Bill of this nature without having some indication of the policy of Parliament.

The course that the President proposes should be taken to secure an indication of the "policy of Parliament" in this particular matter is the one anticipated; and he hopes it will have the acceptance of the House. His proposal is that a Select Committee of the House should be appointed to consider whether, in the circumstances, any temporary modification of the existing statutory requirements with regard to price and dividend, or any other form of relief, should be allowed in the case of those undertakings whose financial conditions have been, or may be, injuriously affected by causes arising out of the war. The appointment of such a Committee would give the House the necessary guidance to enable them to determine whether the Bills should proceed, or whether some other plan should be adopted which would afford relief to any gas or electric light undertakings where financial hardship is shown. There is fear—it was indicated by the remarks of Sir Fortescue Flannery—that there will be some delay in the matter, and that the proceedings will be protracted. But both the President of the Board and the Chairman of Ways and Means (the Rt. Hon. J. H. Whitley) showed that their intention is to accelerate matters, and get a report as quickly as possible from any Committee that may be appointed. We see no reason why this session's Bills incorporating other subjects should not proceed, leaving the parts as to gas prices and dividends to be dealt with later; and, for the matter of that, if our surmise is correct as to the views of the Board of Trade, it would be quite within the power of Parliament, in any measure authorizing the Board to act in the revision of gas prices and dividends, to provide specifically for the Bills that deal only with this question and the sections of the other promotions making similar proposals to be handed over to the Board for consideration and treatment. The matter, however, is only in the preliminary stages at present; and the debate upon it will be resumed, and probably a formal recommendation be submitted, on Thursday, April 11—that is, after the Easter Recess—as to the appointment of a Committee. It is to be hoped that then a move will be speedily made. Every week that the present appalling conditions hang over the gas industry without a settlement so much the worse is it for all concerned in its work and welfare.

Coal Supplies Reduction and Gas Rationing.

THOSE who read the short note that preceded the editorial articles in last week's issue will have been prepared for the announcement as to a reduction of coal supplies that was made by Sir Albert Stanley when dealing with the Gas Bills in the House last Wednesday; and probably some perceptive ones will not have been surprised at the accompanying intimation as to gas and electricity rationing. The curtailment of coal supplies and the gas rationing are both only applicable to London and the Southern Counties, as shown by a line drawn diagonally across the map from the Wash to the Bristol Channel. But that is not all. There are time restrictions as to the use of gas and electricity that will apply to the whole of Great Britain. There is to be no shop window lighting; places of entertainment—theatres, music halls, cinemas, &c.—are to close at 10.30 p.m.; no meals are to be cooked or served in hotels, restaurants, clubs, boarding-houses, &c., after 9.30, and lights in the dining-rooms are to be extinguished at 10 o'clock; train, tube, and tram services are likewise to undergo restrictions. No great hardship will be experienced over these proposals, although such as there may be will proportionately affect electricity concerns more than gas, with lighting as the main use of their commodity. But this has been largely discounted by the application of Summer Time during the past two years, and now again this year. It will be in the winter months that both gas and electricity will feel the greater effect from the restrictions—particularly the one in

regard to shop window lighting. Coming to the part of the country south of the Wash to the Bristol Channel line, all private consumers of gas and electricity are to curtail their consumption to five-sixths of that of the corresponding quarter; but there will be a minimum allowance beyond which consumption need not be reduced. Every day now the order is expected that will establish this forecast as a compulsory measure.

Gas rationing has been in operation now for some time on the Continent, owing to conditions to which the war has given birth; but that it was likely to come in this country, with our plentiful home supply of coal, was not until recently seriously contemplated. New conditions, however, have arisen which are imperative, and which necessitate the cutting-down of the use of coal for all purposes other than those of munitions making. London householders were coal rationed last year; there is to be a further tightening of supplies for them this year. The coal-rationing scheme as applied to London last year is now to be applied pretty generally in the country. The primary new condition that has arisen is that vessels that have been carrying coal to the amount of 3 million tons annually to London and the South have to be utilized by the Government in another direction; and with their depreciated carrying power, the railway companies find it is absolutely impossible to cope with more than half the quantity of coal that has hitherto by way of the sea contributed to the supplies of London and the South. Thus regulation has to ensure that there is a diminution of 1½ million tons in the consumption of coal in London and the twenty-three counties south of the diagonal line drawn from the Wash to the Bristol Channel.

These briefly are the facts. It is true the household coal-rationing scheme will contribute to the necessary saving; so will the general restrictions as to shop window lighting, cooking and lighting at hotels, &c., and, to a small extent, the earlier closing of all places of entertainment. Private electric lighting will also make a contribution. But it seems to us that gas undertakings, through the one-sixth curtailment of their consumers' consumption—other than munitions works, hospitals, nursing homes, and the like—are intended unfairly to bear the chief burden of the contribution; their only off-set being that, with the household coal rationing, they will get a freer market for their coke. Some (under war conditions) of the hard-pressed gas undertakings will look on gas rationing as a positive blessing; other undertakings will not, for their capital and many other charges (this is a point bearing upon the Gas Bills) will remain the same with the loss of one-sixth of their gas business through existing services, meters, and fittings. Our contention as to the disproportionate incidence of the burden of coal restriction upon the gas undertakings is readily seen by calculation. According to the last-issued detailed Board of Trade returns, the consumption of coal by gas undertakings in London and the twenty-three counties south of the diagonal line was 7,694,320 tons; and through the increase in the consumption of gas since then (which has meant a better utilization of coal that would otherwise have been burned in house grates and factory furnaces), this total has probably been enlarged. But taking the cited figure, one-sixth part of it amounts to no less than 1,282,386 tons, which is within a quarter of a million tons of the amount that the President of the Board of Trade says is the quantity by which there must be a reduction of the coal consumption in London and the Southern Counties. Yet there is no other industry that uses its coal with such economy and so much national benefit as the gas industry! The electricity industry, for example, cannot claim, as can the gas industry, that it puts on to the market (apart from the primary commodity) half the weight of the coal it uses as coke, supplies other industries with their "raw" materials, contributes so largely the requisites for the making of high explosives, provides liquid fuel for the Navy, supplies other essentials for the war, as well as a fertilizer for the land. We cannot think the Ministry of Munitions will look with approval on this drastic lessening of their sources of supplies, nor will the Board of Agriculture. Assuming that 11,000 c.ft. of gas are sold per ton of coal, one-sixth part of the sale of gas from the 7,694,320 tons of coal would mean 14,106,250,000 c.ft.; and a considerable part of this is used for private cooking and heating instead of coal. These restrictions, Sir Albert Stanley says, are the minimum which circumstances demand at the present time. The restrictions it seems to us, examining them as they affect the gas industry, have had a crude and arbitrary fixing. He also predicts (while not suggesting that the restrictions will have to be applied for an extended period) that, if they do not produce the desired results, it may be necessary to extend them later on. If still further curtailment is essential, then something should be done to see whether a larger contribution cannot be made to it in those areas geographically better situated in respect of coal supplies, and so relieve London and the Southern Counties, which are now paying a very heavy penalty for their unavoidable remoteness from the coalfields.

Let us return to the proposal to issue an order prohibiting the consumption by consumers of more that five-sixths of their use of gas and electricity in the preceding corresponding quarter. This is a very rough means of producing a reduction of consumption. How consumers of gas with its multifarious uses at different times of the day—for lighting, cooking, and heating—can really gauge whether day by day they are down one-sixth, beats our comprehension. How prepayment consumers who have kept no accounts for corresponding quarters, and are getting less gas now per penny than then, are to order their consumption so as to realize a one-sixth reduction, is something that is too enigmatical for our solution. Perhaps a penalty would produce economical use of a guesswork order. Anyway the best method of imposing a penalty is to place a stiff price, as in Germany, upon all gas used above a certain maximum allowance. Under the arbitrary five-sixths part, the wasteful consumer in the preceding corresponding quarters is going to fare better than the one who was economical. The latter is now to pay the penalty of economy; the waster is going to derive a reward for his prior extravagance. It is an inappreciative world; and the Board of Trade is a unit in it. The scales of justice, too, do not, according to the manner of handling, always indicate a true balance. Still those who legislate should ensure that their plans can be practically applied. We have our doubts in this instance. One practical point is that, when the regulation is officially made, the year 1917 should be specifically mentioned as the one to which the five-sixths should apply. Otherwise, if the regulation simply specifies the corresponding quarter of the preceding year, and the war continues (we sincerely hope it will not) into 1919, in that year the consumer would only have the right to use five-sixths of the reduced consumption of 1918—subject, of course, to the fixed minimum.

The Tyranny of the Times.

Before the war, complaint was made of impediments to the progress of the gas industry. In the same way, complaint will be made after the war, and perhaps with reinforced vigour. But it is the present time with which we are immediately concerned; and there is justice in complaint. The statement may be ventured that no manufacturing and trading industry has been placed during the war in the bonds of economic slavery with greater severity than the gas industry. Everything has been diverted from the normal path. Up to a point, this could not be helped; but it is equally obvious that things might have been made easier for the industry. Gas undertakings have to pay high prices for coal, transport, and handling. Bad stuff is sent, which detracts from the quantity and quality of the products, reduces plant efficiency, and increases the pressure of labour. The miners it is said are the masters in this matter; and it is their obstinacy that scatters uneconomy through the land. But there is also the working of thin inferior seams, to which Mr. Thomas Glover recently drew attention. For some of the products of gas-works, the Government chooses the market, and controls prices at figures that are inconsistent with what they should be in view of the costs of materials and labour. There is no assurance that top figures have yet been reached for coal; and labour is restless over a level of remuneration that is helping to throttle an industry that, without any intention or desire to be profiteers, is trying to serve the national interests and those of local communities.

The consumers have to pay more for gas. Income rolls in with greater freedom for the amount of business done. It rolls out again with greater alacrity, and leaves the stock and share holders with nothing much as recompense for the use of their capital. Better by far would it have been for the bulk of such holders had they during the war had their money in some other business. Only financial inducements of an uncommon order in respect of rate of interest and security will now bring money to the industry. Beyond this

much of the plant that is being worked at full pressure at times of maximum load can only be repaired, and renewals effected, by the sanction of the Government authorities, and then only (if the materials and labour can be secured) at a heavy cost. It is no use to attempt to visualize where coal, oil, labour, transport, or materials are leading to. The only thing that can be done is to negotiate for the future with a pretty fair confidence that, bad as things are at present, in the aggregate they cannot be better, but may be worse, this side of the end of the war. There may be improvements here and there, which will most likely be off-set elsewhere by a worsening of conditions. New edicts and new situations come upon the industry with severity; and the same applies to certain other industries. The Government want more and more money to pay for the war. It is doing its best to choke people off from spending money uselessly and extravagantly, and to induce them to invest in War Loan. This is good. But, on the other hand, measures are framed which prevent the development of industries and enterprise that are the source from which the money springs. This is not good. The picture that results from taking a practical survey of the position, though painted in dark pigments, cannot in the circumstances be described as the product of pessimism.

The tyranny of the times is epidemic; and it has been—perhaps unwittingly—fostered by the Government in every conceivable way. Now the tyranny of the times is master of the Government. We see the proof in connection with labour. We see it in the reports of the Select Committee on National Finance, particularly the one noticed last week dealing with the Ministry of Munitions. We see it in what has happened in the gas industry. It is something that has spread as a cancerous growth. It could all have been very different. The heavy control of the Government over the gas industry is due to the effects of existing legislation, and to so much being required of it. The combined causes have temporarily affected not its trading, but its financial stability, and the possibility of doing even justice to the users of the various products, and of earning a fair return upon the capital required in the business. We do not wish the Government to do exactly the like to other industries; but they could as easily have controlled on just lines other industries that are essential to the country's well-being, if they had provided in the first instance machinery powerful enough for the purpose. We are paying dearly for the mistakes and omissions of the past. The hope is that the ill-effects of these mistakes and omissions will soon end their incremental career, though it will be long before we witness their final disposal. That much can be positively said.

A Sulphuric Acid Makers' Association.

Following hard on the issue of the report of the Departmental Committee on the post-war position of the sulphuric acid and fertilizer trades, the sulphuric acid makers have determined upon the formation of a strong Association. This step was taken at a meeting held last Friday. The establishment of such an organization was recommended as an advisable step by the Departmental Committee; but the idea is not by any means new. It was favoured by Mr. Edgar P. Chance some two years ago. In the report of the Executive Committee of the National Gas Council issued last October, reference was made to the proposal; and it was then stated that the Committee were awaiting the report of the Departmental Committee before advising the gas industry on the subject. The matter is of considerable importance to gas undertakings, as producers of sulphur and (in some cases) sulphuric acid, and as buyers of acid; and the importance has been intensified by the fact that the plants that have been brought into use during the war will give a post-war excess of production equal to 350,000 tons. This is the latest estimate of Sir William Pearce, M.P.; the earlier ones we believe ran to between 400,000 and 500,000 tons. With such an excess capacity as 350,000 tons, it is useless for further gas undertakings to contemplate taking up the manufacture of sulphuric acid on their own account; but this is all the more reason why the position of gas undertakings as purchasers of sulphuric acid should be safeguarded.

The National Gas Council are to have two representatives on a Committee of extensive composition who are to act as an Organizing Committee to the new Association, and to arrange the details as to constitution. We do not know in what capacity the two members of the National Gas Council will be invited to be present—whether as representing gas undertakings making sulphuric acid, or gas undertakings generally as sulphur suppliers and sulphuric acid users. Anyway among the number on the Committee the two representatives can have nothing more than nominal importance. It depends upon the purposes of the new organization whether it will be generally acceptable. The Departmental Committee's advocacy of the formation of such an Association seems to have as its foundation the surplus productive capacity for sulphuric acid that there will be after the war; and it was their view that it would be useful to have an Association for consultation and co-operation in the solution of the problems now to be faced. But it may be doubted whether the manufacturers will have any such limited ideas. Naturally they see their interests affected by the existence of the considerable surplus productive capacity; while consumers—equally naturally, if the law of supply and demand holds good with sulphuric acid—see in this excess capacity a prospect of obtaining sulphuric acid at a cheaper rate. As Mr. Edward Shortt, K.C., M.P. (who was Chairman of the Departmental Committee), said at the meeting of the makers, Associations of the kind are good if their objects are of a legitimate character; but the fact that he has now been appointed Chairman of a Committee to report on what safeguards are necessary to protect consumers against trade organizations is an indication that the Government are not persuaded that such organizations are always run with an eye to the interests of the community, but that their objects are sometimes circumscribed by wholly selfish desires. The development of the new Association will be watched with interest by the gas industry; and the advice in regard to it promised by the Executive Committee of the National Gas Council will also not be without its interest.

The Oil Position.

Hopes regarding the oil situation must not be buoyed-up by the fact that the imports of petroleum products into this country during the first two months of the year have been in volume of a remarkably high order. This is probably due to the extraordinary quantity of fuel oil received in the short time—most likely for Government purposes, as it will be remembered that an Order has lately been published prohibiting the importation of fuel oils. Imports of gas oil for the two months are less than 5 million gallons; and the value put upon it by the Board of Trade is (approximately) 1s. per gallon. Between this figure and what has to be paid in the market there is a notable difference There is no question that, in this matter of oil supply, the Governments of the United States and of this country and its Allies are working in unison. President Wilson has issued a proclamation which brings under regulation trading in oil—including fuel and gas oils. All American concerns engaged in the production of, or trading in, fuel oil (including gas oil) whose sale amounts to more than 100,000 gallons a year are now compelled to apply, under certain rules and conditions, for licences to enable transactions to be made. It is very clear that the gas industry here must not look for much assistance from oil next winter, even if it could afford to utilize it to any extent at the price. Our own Government are now appreciating more than ever they have hitherto done that, in so largely depending upon supplies of petroleum and its products from a distance across the sea, we are not in a secure position; and so, apart from what is being done in connection with the extraction of oil from cannels, shales, and coal, they have at length entered into arrangements for trial borings to be sunk with the view to ascertaining whether the homeland has during the ages been engaged in the subterraneous hoarding of oil.

Corrosion of Refractory Materials.

On March 12 we had Mr. Thomas Glover [see pp. 485, 501] advocating the grading and washing of certain classes of coal as a prelude to carbonization, with the view to the realization of more profitable results in the products. The washing might also have the effect of reducing the quantity of salt in some coals which has a corrosive action on the retort structure. This, however, according to the studies of Herr Schwenke, of Herringen, does not give complete immunity from trouble in connection with coke-ovens; and so he has been experimenting with refractory materials to find one which will resist the action of excessive

quantities of common salt in coal. He has now come to the conclusion—using a Koppers regenerative oven—that the best thing for protection is a lining of highly acid and well burnt bricks of about 85 p.ct. of SiO_2 (silica), with close texture. So lined an old battery of ovens was kept at work five years without repair, till working was temporarily stopped by the war. Photographs of an oven with twelve rows of 90 p.ct. SiO_2 bricks laid in lime and another oven lined with 85 p.ct. SiO_2 bricks with fireclay joints, with equal service in time and quantity of coal, show the former bricks with smooth surfaces, the latter rough and full of cracks. In spite of the excess of salt in the coal charged into the oven, the 90 p.ct. SiO_2 bricks were better than those of the 5 p.ct. lower category in respect of silica. The experience will no doubt be practically examined in interested British quarters.

Coal and Coke Exports.

The volume of the coal, coke, and manufactured fuel exports is still on the down-grade. Last month the total sent out of the country was 2,632,019 tons, which was a reduction on 1916 of 778,365 tons, and on 1917 of 270,598 tons. The total value last month is computed at £3,747,943, which is an increase of £379,794 upon February, 1916, when a much larger quantity was exported, but a reduction of £34,593 upon February, 1917, when (as mentioned above) 270,598 tons more were shipped. The sellers, however, have done better per ton, seeing that £1 8s. 6d. was the average value for last month, as against a shade over £1 6s. in February, 1917. The total exports for January and February were: 1918, 5,519,592 tons; 1917, 6,391,111 tons; 1916, 6,693,483 tons. The values were for the two months: 1918, £7,878,874; 1917, £8,370,763; 1916, £6,590,309.

PERSONAL.

Mr. Cyril G. Davis (Davis Gas-Stove Company) has been elected a member of the Institution of Mechanical Engineers.

Mr. Joseph T. Broughton, Engineer and Manager of the Congleton Corporation Gas-Works, has been appointed to a similar position with the Haslingden Union Gas Company.

Wide sympathy will be felt with Mr. and Mrs. Harry Wimhurst, of Sleaford, in the sad loss they have sustained through the death of their youngest daughter, Ethel, who was the wife of Lieut. James Hepherd, Battalion Transport Officer, M.G.C.

The Directors of the Gas Light and Coke Company have appointed Mr. Stephen Lacey, Distributing Engineer, in succession to Mr. H. S. Reeson, who has resigned. Mr. Lacey, who has for some years past acted as deputy to Mr. Reeson, is the son of Mr. T. S. Lacey, of Beckton.

In September, 1916, at the request of the Council, Mr. W. A. Tookey consented to act as Secretary of the Junior Institution of Engineers for the duration of the war; but to the regret of the members, professional duties have now compelled his retirement from this position, though he will retain his direction of affairs in the capacity of Hon. Secretary and Treasurer. Mr. Herbert G. Riddle has now taken up the duties of Secretary.

A pleasing photograph appeared in last Sunday's "Illustrated Herald" of Captain Edric W. Broadberry, M.C., receiving a family greeting on leaving Buckingham Palace after his investiture. Captain Broadberry (who is the eldest son of Mr. A. E. Broadberry, M.Inst.C.E., of Tottenham) appeared in the list of Army Honours at the beginning of the year, as having been awarded the Military Cross for distinguished service in the field.

M. Lucien Rolland d'Estape has been elected a Director of the Paris Gas Company, in place of M. Cornuault deceased. The death of M. Cornuault having also rendered vacant the vice-chairmanship of the Board of the Société d'Eclairage, Chauffage, et Force Motrice, the position has been filled by the election of MM. René Masse and Henri Damour as joint Vice-Chairmen. M. Cornuault's services as a Director of the Company have been replaced by the election of M. Henri Marquisan.

Mr. J. W. Whimster (the Engineer and Manager of the Bath Gas Company) was married on Saturday to Miss Marjorie Joyce Long. Mr. Whimster is the youngest son of Mr. James Whimster, J.P., of Armagh; while the bride is the elder daughter of the ex-Mayor of Bath. A large number of presents included silver salvers, suitably inscribed, from the Directors and the secretarial and engineering staff respectively of the Bath Gas Company, and cases of silver teaspoons and of pipes from the employees at the works.

An interesting function took place in the offices of the Hebden Bridge and Mytholmroyd Gas Board last Thursday. Mr. Chas. Robertshaw, the present Chairman, has given to the Board a large framed photograph of Mr. James Simpson; and the foot has been illuminated with this inscription: "Mr. James Simpson, J.P., Chairman of the Hebden Bridge and Mytholmroyd Gas Board for 16 years, and member of the Board since its formation 23 years ago, 1895-1917." The photograph has been hung in the Board Room; and Mr. Robertshaw, in presenting it, spoke of the great progress made at the works during Mr. Simpson's connection with it. He mentioned that, when the works were taken over from the Company, the make of gas was about 60 million c.ft. a year; whereas now it was 100 millions. The Board thanked Mr. Robertshaw for the present.

GAS-WORKERS' WAGES DEMANDS.

Arbitration Proceedings.

Last Thursday, arbitration proceedings took place before the Committee on Production, arising out of a national claim for a general advance in wages put forward on behalf of male and female workers engaged in gas undertakings, municipal and private, throughout the country. Some 50,000 employees in London, and upwards of 1,000,000 workers in the kingdom generally, are affected. Over 200 companies and corporations were represented, together with the men's unions; and the large attendance necessitated an adjournment from the Committee on Production's offices, in Old Palace Yard, to the Central Hall, where the case was heard in private under the presidency of Sir George Gibb. Mr. Will Thorne, M.P. (Secretary of the National Union of General Workers), Mr. W. Simpson (Birmingham Gas Workers), and Mr. Wignall (Dockers' Union, Bristol), argued the case for the employees; and Mr. D. Milne Watson represented the employers.

The application, which was based on the continued high cost of living, was for an increase of 10s. per week on the adult wages in January last, and a similar advance to be paid to juniors and women who are doing work previously done by men; all Sunday work and holidays to count as Sunday time, with a minimum of not less than 20s. per week on pre-war rates for all adult workers. In addition, a claim was put forward for the 12½ p.ct. war bonus on earnings already granted in the electric lighting industry and the engineering trade.

Sir George Gibb announced that the decision of the Committee on Production would be given later.

In response to a demand by Brighouse Corporation workers, through the Workers' Union, for £1 per week advance on pre-war wages, *plus* 12½ p.ct. bonus on total earnings, the Committee on Production have awarded, as from the first full pay-day in January, 1918, 8d. per shift advance to shift workers over 18 years of age, and 4s. per ordinary week to other workers. The previous increases have been 12s. to 16s. per week. There is no mention in the award of the 12½ p.ct. bonus.

COALITE HISTORY IN BRIEF.

To give the history of the Coalite Companies in a single article in the "Financier" is hardly doing justice to it, though probably very convenient to compress it, as it saves the necessity of supplying many details as to the financial, technical, and commercial mess that constitutes so much of that history, and has not furnished the shareholders with dividends, but only so far with considerable losses and anxiety. It would have been interesting if the writer of the twelfth article of the series had mentioned the total sum that has been lost in this adventure in company promotion. He cites the chain of companies who "hold" and "operate" the Coalite "patents"—Coalite, Limited, the British Coalite Company, the Barnsley Smokeless Fuel Company, and Low Temperature Carbonization. The Eticoal Syndicate does not appear to be worthy of a place in the record. The writer of the article is true to the trust reposed in him. He speaks as though Coalite was the only low-temperature system in existence.

> The very earnest consideration that is now being given by the Government to the national importance of the Coalite products, and, indeed, the practical recognition accorded, portend big developments in the near future. If reasonable expectations thus inspired be fulfilled, then this Company and its associate undertakings should reap the reward that has been well earned by indomitable effort, but far too long delayed.

It is within our knowledge that the Government have also been giving "earnest consideration" to other low-temperature systems. The "practical recognition" by the Government, we suppose, refers to the putting of £10,000 into the Barnsley concern, which step was subsequently referred to in the House, when it was shown pretty conclusively that the Government had no intention to extend their patronage, because they found that the Coalite process would not serve the purposes which they had then in contemplation—the provision of materials for high explosives. The "if" before "reasonable expectations" indicates the foresight and the caution of the writer. "Reasonable expectations" appear to be easily inspired judging by Coalite literature.

There is an interesting feature about this particular article of the series. It ascribes much of the misery and misfortune of the British Coalite Company to this—

> On the very day the prospectus of the British Coalite Company appeared, "The Times" and other papers also contained an advertisement of what purported to be a new smokeless fuel, which portended very serious competition by powerful interests.

> The immediate result was that the underwriters were scared and withdrew their commitments. They can scarcely be blamed in the circumstances, for it naturally seemed to them a grave risk.

This, it is stated, caused a temporary wreckage of Coalite prospects. It is asked, "Where is the vaunted smokeless fuel now?" And then the remark: "Its producers with their large capital and mechanical resources might surely have persevered if they were confident of their ability to beat Coalite out of the field in fair and open competition; but, for some unexplained reason, the enterprise was allowed to lapse after it had caused a temporary wreckage of Coalite's progress." Surely the Coalite Company, who had not ceased their endeavours, boasts, or claims might have beaten all such aspirants out of the field in open competition. But they did not. The reason for the disappearance of the competitors with fuel containing a higher percentage of volatile matter than ordinary gas coke was that there was not a sufficient public demand for it at the higher price that had to be charged for ordinary coke and in competition with household coal at then prices. The Coalite Company know this to be the reason as well as we do. Yet prior to this nonsense in trying to place upon competitors the primary cause for Coalite misfortunes, the article states that, from the experimental plant at Wednesfield, "such excellent results were obtained that it was decided to form the British Coalite Company." If this be true, why the "temporary wreckage of Coalite's progress." "Temporary!" Yet this happening dates back some nine or ten years! The "temporary" wreckage seems to have been of somewhat long duration. But notwithstanding the "excellent results" at Wednesfield, the article tells us that, when the system was installed at Barking—another of the graveyards of Coalite hopes—it was found that cast-iron retorts were radically unsuitable; they buckled, and became semi-porous. It had taken a considerable time to ascertain this; for Barking after Wednesfield was not the only place where cast-iron retorts were installed by the Coalite Company on a considerable scale, and always with a beating of the big drum. Cast-iron retorts are quite suitable for true low-temperature carbonization; but the fact of the matter is that the temperatures adopted by Coalite have been rising from the initial stages. Hence the adoption of fireclay—the same as in gas-works practice. Now it is stated that the plant at Barugh, near Barnsley, may be seen in "perfectly satisfactory" operation. It was not long since that, at the annual meeting of the Company, the Chairman referred to stoppages and difficulties at Barugh. Coalite has in its day had a good many quick transformations.

There is one real national service that Coalite has done. It was the means of having some Germans interned; and for this it has our gratitude. Let the article tell the tale:

> When the fortunes of the Coalite group seemed at their lowest ebb—that is to say, in 1912—German interests showed more faith and enterprise than financiers and industrialists of this country; and they sent over representatives to investigate. These early in 1913 undertook to enter into a contract for the erection of low-temperature plants throughout the United Kingdom and on the Continent—provided they were permitted to have a year's tests. When the tests were completed and acknowledged to be satisfactory, the German interests sent over a large staff of draughtsmen, engineers, chemists, and other experts for the construction of the Barnsley plant. That was just before the war broke out; and the outbreak of hostilities made them enemy aliens, with the result that they were interned. From a patriotic standpoint that was good business; but it deprived the Coalite companies of the handsome royalties contracted for. Nevertheless, the German industrial invasion showed the estimation in which the Coalite processes were held by Continental experts and financiers; and the Barnsley works were proceeded with. There, profiting by the mistakes and disappointments of the past, the pioneers have achieved such success as has assured the co-operation of important financial interests that are now bent on realizing one of the most momentous revolutions our industrial history has known.

It is the same old Coalite drum that exists to-day.

Modern Developments in Gas-Works Construction and Practice.—The discussion on Mr. Alwyne Meade's paper before the Institution of Civil Engineers [*ante*, p. 502] was concluded last Tuesday; closing with a speech by the President (Mr. H. E. Jones). Those who took part in the discussion were Messrs. Henry Woodall, Charles Hunt, Thomas Glover, Thomas Goulden, Stanley H. Jones, Samuel Glover, G. M. Gill, C. E. Jones, and J. G. W. Aldridge.

The British Engineers' Association.—At the sixth annual general meeting of the Association, the President (Sir Wilfrid Stokes), in moving the adoption of the report of the Council, referred to the growth of the work of the Association—particularly in relation to the obtaining of inquiries from Overseas, the issue of the Association's Directories, and the numerous services rendered to individual members. The new President is Colonel Armstrong, D.S.O., Chairman of Messrs. Greenwood and Batley, Ltd., of Leeds; while the other members of Council include Sir John Hunter (Messrs. Sir William Arrol & Co., Ltd.), Mr. T. Cuthbert Stewart (Messrs. Stewarts and Lloyds, Ltd.), and Mr. J. C. Ward (Messrs. Edgar Allen & Co., Ltd.). Various other Associations are represented on the Council; Mr. George Clark of the Bryan Donkin Company, Ltd.) acting in this capacity on behalf of the Society of British Gas Industries.

ELECTRICITY SUPPLY MEMORANDA.

THERE is more than one electro-culture muddle in the electrical industry. With all the electro-culture of men's brains for the purpose of making them efficient electrical engineers, they do not all seem capable of completely compassing the points of a question before coming to a decisive opinion upon it. For example, they talk lightly of uniting coal carbonization with electricity generation, in addition to the extensive coal carbonization plants already in existence; but no one can tell if this would pay, or if the secondary products yield would not so assist to overbalance market conditions that, instead of diminishing the cost of generation, they would increase it through hopes as to values not being realized. They talk of huge generating stations and long-distance transmission systems; but no one seems to have calculated the cost of transmission (including the expense of transporting the secondary products of coal carbonization) in relation to the transmission of other agents, even of coal. They ramp, too, over the question of utilizing electricity for intensifying the production of food. No electrical engineer can yet tell us whether the electrification of crops will, even if it actually hastens or stimulates them, have any detrimental physiological action upon them. An eminent physician, writing recently in "The Times," says: "The problems are highly complex; the sources of fallacy are numerous. Even should it be proved that the electrification of crops or seeds does hasten their growth or increase their immediate productiveness, it will still have to be shown that with mere increase in bulk there is no deterioration of quality, impairment of fertility, or diminished resistance [of the crops?] to disease." These things, however, do not trouble electrical advocates. It is a pity they do not look at all sides of a question and the possibilities before beginning serious advocacy.

Complete Compassing of Considerations.

Again, in the matter of huge concentrations of generating plant, there has been occasional allusion to, but not a general electrical recognition of, the danger in time of war—particularly in these days of fast-speed and heavy bomb-carrying aircraft—of such schemes. We are hoping for a permanent peace after the war. But who can tell what will happen with mundane affairs in the hands of men with different aspirations, and different views as how best to attain them? Anyway, it will never do for any nation to again be found unprepared for war; and among the preparations must be a sound defensive system in the country. Let us suppose that munition works depended for power upon the proposed huge concentrations of electric generating plant, what could be more to the taste of an enemy at war than to have such concentrations for objectives in their bombing expeditions? A few well-placed bombs might cause an immense delay or reduction in the production of munitions. It does not seem to require so much as the bursting of a bomb to cause a dislocation and interruption of work over a large area depending upon a single electrical station for power. Under the side heading of "Bonnybridge," the "Electrical Review" reports that the bursting of a large cast-iron pipe at the works of the Scottish Central Electric Power Company caused serious dislocation of work in Stirlingshire and Linlithgowshire. Over an area of about 400 square miles, labour in a large number of iron and steel works, brick-works, and collieries was entirely suspended. In a number of the steel works, the furnaces (which were fully charged) cooled, necessitating the blasting of the solid contents. That cast-iron pipe has supplied a good piece of testimony as to the danger of large electrical concentrations; and perhaps it will be of help in making the concentrationists see that their plans have another and an important side. Assuming (without admitting) that there is economy in their plans, the production of the economy may possibly be accompanied by risks which may some day produce not merely a temporary peace-time industrial disaster, but a war-time national one.

The Lesson of an Accident.

An "Occasional Contributor" to the "Electrical Times" is, like many other electrical men, concerned over the effect that the report of the Coal Conservation Sub-Committee of the Reconstruction Committee may have upon people who are not in the actual know, and so cannot appraise the report at its true value. There is no doubt that the report would lead the casual lay reader to think that the members of the electrical profession are all mad or incompetent, with perhaps an exception on the North-East Coast. The big cities, for example, have placed stations in unsuitable positions, apparently because by this means the rateable value came into the owning towns themselves. The contributor to our contemporary is of opinion that such criticism will affect the interests of electricity supply when it comes to election speeches. It will make a nice tit-bit for candidates for municipal honours to be enabled to quote the authority of a Committee which has been at work under the ægis of the Ministry of Reconstruction, and has received the blessing of Lord Haldane for the beneficent work that it is supposed to have done in pointing to a serious leakage in national wealth through the misuse of coal. The new critic opines that those who form the thinking part of the electorate will each say: "Just

The Report and Unfair Criticism.

regard to shop window lighting. Coming to the part of the country south of the Wash to the Bristol Channel line, all private consumers of gas and electricity are to curtail their consumption to five-sixths of that of the corresponding quarter; but there will be a minimum allowance beyond which consumption need not be reduced. Every day now the order is expected that will establish this forecast as a compulsory measure.

Gas rationing has been in operation now for some time on the Continent, owing to conditions to which the war has given birth; but that it was likely to come in this country, with our plentiful home supply of coal, was not until recently seriously contemplated. New conditions, however, have arisen which are imperative, and which necessitate the cutting-down of the use of coal for all purposes other than those of munitions making. London householders were coal rationed last year; there is to be a further tightening of supplies for them this year. The coal-rationing scheme as applied to London last year is now to be applied pretty generally in the country. The primary new condition that has arisen is that vessels that have been carrying coal to the amount of 3 million tons annually to London and the South have to be utilized by the Government in another direction; and with their depreciated carrying power, the railway companies find it is absolutely impossible to cope with more than half the quantity of coal that has hitherto by way of the sea contributed to the supplies of London and the South. Thus regulation has to ensure that there is a diminution of 1½ million tons in the consumption of coal in London and the twenty-three counties south of the diagonal line drawn from the Wash to the Bristol Channel.

These briefly are the facts. It is true the household coal-rationing scheme will contribute to the necessary saving; so will the general restrictions as to shop window lighting, cooking and lighting at hotels, &c., and, to a small extent, the earlier closing of all places of entertainment. Private electric lighting will also make a contribution. But it seems to us that gas undertakings, through the one-sixth curtailment of their consumers' consumption—other than munitions works, hospitals, nursing homes, and the like—are intended unfairly to bear the chief burden of the contribution; their only off-set being that, with the household coal rationing, they will get a freer market for their coke. Some (under war conditions) of the hard-pressed gas undertakings will look on gas rationing as a positive blessing; other undertakings will not, for their capital and many other charges (this is a point bearing upon the Gas Bills) will remain the same with the loss of one-sixth of their gas business through existing services, meters, and fittings. Our contention as to the disproportionate incidence of the burden of coal restriction upon the gas undertakings is readily seen by calculation. According to the last-issued detailed Board of Trade returns, the consumption of coal by gas undertakings in London and the twenty-three counties south of the diagonal line was 7,694,320 tons; and through the increase in the consumption of gas since then (which has meant a better utilization of coal that would otherwise have been burned in house grates and factory furnaces), this total has probably been enlarged. But taking the cited figure, one-sixth part of it amounts to no less than 1,282,386 tons, which is within a quarter of a million tons of the amount that the President of the Board of Trade says is the quantity by which there must be a reduction of the coal consumption in London and the Southern Counties. Yet there is no other industry that uses its coal with such economy and so much national benefit as the gas industry! The electricity industry, for example, cannot claim, as can the gas industry, that it puts on to the market (apart from the primary commodity) half the weight of the coal it uses as coke, supplies other industries with their "raw" materials, contributes so largely the requisites for the making of high explosives, provides liquid fuel for the Navy, supplies other essentials for the war, as well as a fertilizer for the land. We cannot think the Ministry of Munitions will look with approval on this drastic lessening of their sources of supplies, nor will the Board of Agriculture. Assuming that 11,000 c.ft. of gas are sold per ton of coal, one-sixth part of the sale of gas from the 7,694,320 tons of coal would mean 14,106,250,000 c.ft.; and a considerable part of this is used for private cooking and heating instead of coal. These restrictions, Sir Albert Stanley says, are the minimum which circumstances demand at the present time. The restrictions it seems to us, examining them as they affect the gas industry, have had a crude and arbitrary fixing. He also predicts (while not suggesting that the restrictions will have to be applied for an extended period) that, if they do not produce the desired results, it may be necessary to extend them later on. If still further curtailment is essential, then something should be done to see whether a larger contribution cannot be made to it in those areas geographically better situated in respect of coal supplies, and so relieve London and the Southern Counties, which are now paying a very heavy penalty for their unavoidable remoteness from the coalfields.

Let us return to the proposal to issue an order prohibiting the consumption by consumers of more that five-sixths of their use of gas and electricity in the preceding corresponding quarter. This is a very rough means of producing a reduction of consumption. How consumers of gas with its multifarious uses at different times of the day—for lighting, cooking, and heating—can really gauge whether day by day they are down one-sixth, beats our comprehension. How prepayment consumers who have kept no accounts for corresponding quarters, and are getting less gas now per penny than then, are to order their consumption so as to realize a one-sixth reduction, is something that is too enigmatical for our solution. Perhaps a penalty would produce economical use of a guesswork order. Anyway the best method of imposing a penalty is to place a stiff price, as in Germany, upon all gas used above a certain maximum allowance. Under the arbitrary five-sixths part, the wasteful consumer in the preceding corresponding quarters is going to fare better than the one who was economical. The latter is now to pay the penalty of economy; the waster is going to derive a reward for his prior extravagance. It is an inappreciative world; and the Board of Trade is a unit in it. The scales of justice, too, do not, according to the manner of handling, always indicate a true balance. Still those who legislate should ensure that their plans can be practically applied. We have our doubts in this instance. One practical point is that, when the regulation is officially made, the year 1917 should be specifically mentioned as the one to which the five-sixths should apply. Otherwise, if the regulation simply specifies the corresponding quarter of the preceding year, and the war continues (we sincerely hope it will not) into 1919, in that year the consumer would only have the right to use five-sixths of the reduced consumption of 1918—subject, of course, to the fixed minimum.

The Tyranny of the Times.

Before the war, complaint was made of impediments to the progress of the gas industry. In the same way, complaint will be made after the war, and perhaps with reinforced vigour. But it is the present time with which we are immediately concerned; and there is justice in complaint. The statement may be ventured that no manufacturing and trading industry has been placed during the war in the bonds of economic slavery with greater severity than the gas industry. Everything has been diverted from the normal path. Up to a point, this could not be helped; but it is equally obvious that things might have been made easier for the industry. Gas undertakings have to pay high prices for coal, transport, and handling. Bad stuff is sent, which detracts from the quantity and quality of the products, reduces plant efficiency, and increases the pressure of labour. The miners it is said are the masters in this matter; and it is their obstinacy that scatters uneconomy through the land. But there is also the working of thin inferior seams, to which Mr. Thomas Glover recently drew attention. For some of the products of gas-works, the Government chooses the market, and controls prices at figures that are inconsistent with what they should be in view of the costs of materials and labour. There is no assurance that top figures have yet been reached for coal; and labour is restless over a level of remuneration that is helping to throttle an industry that, without any intention or desire to be profiteers, is trying to serve the national interests and those of local communities.

The consumers have to pay more for gas. Income rolls in with greater freedom for the amount of business done. It rolls out again with greater alacrity, and leaves the stock and share holders with nothing much as recompense for the use of their capital. Better by far would it have been for the bulk of such holders had they during the war had their money in some other business. Only financial inducements of an uncommon order in respect of rate of interest and security will now bring money to the industry. Beyond this

much of the plant that is being worked at full pressure at times of maximum load can only be repaired, and renewals effected, by the sanction of the Government authorities, and then only (if the materials and labour can be secured) at a heavy cost. It is no use to attempt to visualize where coal, oil, labour, transport, or materials are leading to. The only thing that can be done is to negotiate for the future with a pretty fair confidence that, bad as things are at present, in the aggregate they cannot be better, but may be worse, this side of the end of the war. There may be improvements here and there, which will most likely be off-set elsewhere by a worsening of conditions. New edicts and new situations come upon the industry with severity; and the same applies to certain other industries. The Government want more and more money to pay for the war. It is doing its best to choke people off from spending money uselessly and extravagantly, and to induce them to invest in War Loan. This is good. But, on the other hand, measures are framed which prevent the development of industries and enterprise that are the source from which the money springs. This is not good. The picture that results from taking a practical survey of the position, though painted in dark pigments, cannot in the circumstances be described as the product of pessimism.

The tyranny of the times is epidemic; and it has been—perhaps unwittingly—fostered by the Government in every conceivable way. Now the tyranny of the times is master of the Government. We see the proof in connection with labour. We see it in the reports of the Select Committee on National Finance, particularly the one noticed last week dealing with the Ministry of Munitions. We see it in what has happened in the gas industry. It is something that has spread as a cancerous growth. It could all have been very different. The heavy control of the Government over the gas industry is due to the effects of existing legislation, and to so much being required of it. The combined causes have temporarily affected not its trading, but its financial stability, and the possibility of doing even justice to the users of the various products, and of earning a fair return upon the capital required in the business. We do not wish the Government to do exactly the like to other industries; but they could as easily have controlled on just lines other industries that are essential to the country's well-being, if they had provided in the first instance machinery powerful enough for the purpose. We are paying dearly for the mistakes and omissions of the past. The hope is that the ill-effects of these mistakes and omissions will soon end their incremental career, though it will be long before we witness their final disposal. That much can be positively said.

A Sulphuric Acid Makers' Association.

FOLLOWING hard on the issue of the report of the Departmental Committee on the post-war position of the sulphuric acid and fertilizer trades, the sulphuric acid makers have determined upon the formation of a strong Association. This step was taken at a meeting held last Friday. The establishment of such an organization was recommended as an advisable step by the Departmental Committee; but the idea is not by any means new. It was favoured by Mr. Edgar P. Chance some two years ago. In the report of the Executive Committee of the National Gas Council issued last October, reference was made to the proposal; and it was then stated that the Committee were awaiting the report of the Departmental Committee before advising the gas industry on the subject. The matter is of considerable importance to gas undertakings, as producers of sulphur and (in some cases) sulphuric acid, and as buyers of acid; and the importance has been intensified by the fact that the plants that have been brought into use during the war will give a post-war excess of production equal to 350,000 tons. This is the latest estimate of Sir William Pearce, M.P.; the earlier ones we believe ran to between 400,000 and 500,000 tons. With such an excess capacity as 350,000 tons, it is useless for further gas undertakings to contemplate taking up the manufacture of sulphuric acid on their own account; but this is all the more reason why the position of gas undertakings as purchasers of sulphuric acid should be safeguarded.

The National Gas Council are to have two representatives on a Committee of extensive composition who are to act as an Organizing Committee to the new Association, and to arrange the details as to constitution. We do not know in what capacity the two members of the National Gas Council will be invited to be present—whether as representing gas undertakings making sulphuric acid, or gas undertakings generally as sulphur suppliers and sulphuric acid users. Anyway among the number on the Committee the two representatives can have nothing more than nominal importance. It depends upon the purposes of the new organization whether it will be generally acceptable. The Departmental Committee's advocacy of the formation of such an Association seems to have as its foundation the surplus productive capacity for sulphuric acid that there will be after the war; and it was their view that it would be useful to have an Association for consultation and co-operation in the solution of the problems now to be faced. But it may be doubted whether the manufacturers will have any such limited ideas. Naturally they see their interests affected by the existence of the considerable surplus productive capacity; while consumers—equally naturally, if the law of supply and demand holds good with sulphuric acid—see in this excess capacity a prospect of obtaining sulphuric acid at a cheaper rate. As Mr. Edward Shortt, K.C., M.P. (who was Chairman of the Departmental Committee), said at the meeting of the makers, Associations of the kind are good if their objects are of a legitimate character; but the fact that he has now been appointed Chairman of a Committee to report on what safeguards are necessary to protect consumers against trade organizations is an indication that the Government are not persuaded that such organizations are always run with an eye to the interests of the community, but that their objects are sometimes circumscribed by wholly selfish desires. The development of the new Association will be watched with interest by the gas industry; and the advice in regard to it promised by the Executive Committee of the National Gas Council will also not be without its interest.

The Oil Position.

Hopes regarding the oil situation must not be buoyed-up by the fact that the imports of petroleum products into this country during the first two months of the year have been in volume of a remarkably high order. This is probably due to the extraordinary quantity of fuel oil received in the short time—most likely for Government purposes, as it will be remembered that an Order has lately been published prohibiting the importation of fuel oils. Imports of gas oil for the two months are less than 5 million gallons; and the value put upon it by the Board of Trade is (approximately) 1s. per gallon. Between this figure and what has to be paid in the market there is a notable difference There is no question that, in this matter of oil supply, the Governments of the United States and of this country and its Allies are working in unison. President Wilson has issued a proclamation which brings under regulation trading in oil—including fuel and gas oils. All American concerns engaged in the production of, or trading in, fuel oil (including gas oil) whose sale amounts to more than 100,000 gallons a year are now compelled to apply, under certain rules and conditions, for licences to enable transactions to be made. It is very clear that the gas industry here must not look for much assistance from oil next winter, even if it could afford to utilize it to any extent at the price. Our own Government are now appreciating more than ever they have hitherto done that, in so largely depending upon supplies of petroleum and its products from a distance across the sea, we are not in a secure position; and so, apart from what is being done in connection with the extraction of oil from cannels, shales, and coal, they have at length entered into arrangements for trial borings to be sunk with the view to ascertaining whether the homeland has during the ages been engaged in the subterraneous hoarding of oil.

Corrosion of Refractory Materials.

On March 12 we had Mr. Thomas Glover [see pp. 485, 501] advocating the grading and washing of certain classes of coal as a prelude to carbonization, with the view to the realization of more profitable results in the products. The washing might also have the effect of reducing the quantity of salt in some coals which has a corrosive action on the retort structure. This, however, according to the studies of Herr Schwenke, of Herringen, does not give complete immunity from trouble in connection with coke-ovens; and so he has been experimenting with refractory materials to find one which will resist the action of excessive

quantities of common salt in coal. He has now come to the conclusion—using a Koppers regenerative oven—that the best thing for protection is a lining of highly acid and well burnt bricks of about 85 p.ct. of SiO_2 (silica), with close texture. So lined an old battery of ovens was kept at work five years without repair, till working was temporarily stopped by the war. Photographs of an oven with twelve rows of 90 p.ct. SiO_2 bricks laid in lime and another oven lined with 85 p.ct. SiO_2 bricks with fireclay joints, with equal service in time and quantity of coal, show the former bricks with smooth surfaces, the latter rough and full of cracks. In spite of the excess of salt in the coal charged into the oven, the 90 p.ct. SiO_2 bricks were better than those of the 5 p.ct. lower category in respect of silica. The experience will no doubt be practically examined in interested British quarters.

Coal and Coke Exports.

The volume of the coal, coke, and manufactured fuel exports is still on the down-grade. Last month the total sent out of the country was 2,632,019 tons, which was a reduction on 1916 of 778,365 tons, and on 1917 of 270,598 tons. The total value last month is computed at £3,747,943, which is an increase of £379,794 upon February, 1916, when a much larger quantity was exported, but a reduction of £34,593 upon February, 1917, when (as mentioned above) 270,598 tons more were shipped. The sellers, however, have done better per ton, seeing that £1 8s. 6d. was the average value for last month, as against a shade over £1 6s. in February, 1917. The total exports for January and February were: 1918, 5,519,592 tons; 1917, 6,391,111 tons; 1916, 6,693,483 tons. The values were for the two months: 1918, £7,878,874; 1917, £8,370,763; 1916, £6,590,309.

PERSONAL.

Mr. Cyril G. Davis (Davis Gas-Stove Company) has been elected a member of the Institution of Mechanical Engineers.

Mr. Joseph T. Broughton, Engineer and Manager of the Congleton Corporation Gas-Works, has been appointed to a similar position with the Haslingden Union Gas Company.

Wide sympathy will be felt with Mr. and Mrs. Harry Wimhurst, of Sleaford, in the sad loss they have sustained through the death of their youngest daughter, Ethel, who was the wife of Lieut. James Hepherd, Battalion Transport Officer, M.G.C.

The Directors of the Gas Light and Coke Company have appointed Mr. Stephen Lacey, Distributing Engineer, in succession to Mr. H. S. Reeson, who has resigned. Mr. Lacey, who has for some years past acted as deputy to Mr. Reeson, is the son of Mr. T. S. Lacey, of Beckton.

In September, 1916, at the request of the Council, Mr. W. A. Tookey consented to act as Secretary of the Junior Institution of Engineers for the duration of the war; but to the regret of the members, professional duties have now compelled his retirement from this position, though he will retain his direction of affairs in the capacity of Hon. Secretary and Treasurer. Mr. Herbert G. Riddle has now taken up the duties of Secretary.

A pleasing photograph appeared in last Sunday's "Illustrated Herald" of Captain Edric W. Broadberry, M.C., receiving a family greeting on leaving Buckingham Palace after his investiture. Captain Broadberry (who is the eldest son of Mr. A. E. Broadberry, M.Inst.C.E., of Tottenham) appeared in the list of Army Honours at the beginning of the year, as having been awarded the Military Cross for distinguished service in the field.

M. Lucien Rolland d'Estape has been elected a Director of the Paris Gas Company, in place of M. Cornuault deceased. The death of M. Cornuault having also rendered vacant the vice-chairmanship of the Board of the Société d'Eclairage, Chauffage, et Force Motrice, the position has been filled by the election of MM. René Masse and Henri Damour as joint Vice-Chairmen. M. Cornuault's services as a Director of the Company have been replaced by the election of M. Henri Marquisan.

Mr. J. W. Whimster (the Engineer and Manager of the Bath Gas Company) was married on Saturday to Miss Marjorie Joyce Long. Mr. Whimster is the youngest son of Mr. James Whimster, J.P., of Armagh; while the bride is the elder daughter of the ex-Mayor of Bath. A large number of presents included silver salvers, suitably inscribed, from the Directors and the secretarial and engineering staff respectively of the Bath Gas Company, and cases of silver teaspoons and of pipes from the employees at the works.

An interesting function took place in the offices of the Hebden Bridge and Mytholmroyd Gas Board last Thursday. Mr. Chas. Robertshaw, the present Chairman, has given to the Board a large framed photograph of Mr. James Simpson; and the foot has been illuminated with this inscription: "Mr. James Simpson, J.P., Chairman of the Hebden Bridge and Mytholmroyd Gas Board for 16 years, and member of the Board since its formation 23 years ago, 1895-1917." The photograph has been hung in the Board Room; and Mr. Robertshaw, in presenting it, spoke of the great progress made at the works during Mr. Simpson's connection with it. He mentioned that, when the works were taken over from the Company, the make of gas was about 60 million c.ft. a year; whereas now it was 100 millions. The Board thanked Mr. Robertshaw for the present.

GAS-WORKERS' WAGES DEMANDS.

Arbitration Proceedings.

Last Thursday, arbitration proceedings took place before the Committee on Production, arising out of a national claim for a general advance in wages put forward on behalf of male and female workers engaged in gas undertakings, municipal and private, throughout the country. Some 50,000 employees in London, and upwards of 1,000,000 workers in the kingdom generally, are affected. Over 200 companies and corporations were represented, together with the men's unions; and the large attendance necessitated an adjournment from the Committee on Production's offices, in Old Palace Yard, to the Central Hall, where the case was heard in private under the presidency of Sir George Gibb. Mr. Will Thorne, M.P. (Secretary of the National Union of General Workers), Mr. W. Simpson (Birmingham Gas Workers), and Mr. Wignall (Dockers' Union, Bristol), argued the case for the employees; and Mr. D. Milne Watson represented the employers.

The application, which was based on the continued high cost of living, was for an increase of 10s. per week on the adult wages in January last, and a similar advance to be paid to juniors and women who are doing work previously done by men; all Sunday work and holidays to count as Sunday time, with a minimum of not less than 20s. per week on pre-war rates for all adult workers. In addition, a claim was put forward for the 12½ p.ct. war bonus on earnings already granted in the electric lighting industry and the engineering trade.

Sir George Gibb announced that the decision of the Committee on Production would be given later.

In response to a demand by Brighouse Corporation workers, through the Workers' Union, for £1 per week advance on pre-war wages, *plus* 12½ p.ct. bonus on total earnings, the Committee on Production have awarded, as from the first full pay-day in January, 1918, 8d. per shift advance to shift workers over 18 years of age, and 4s. per ordinary week to other workers. The previous increases have been 12s. to 16s. per week. There is no mention in the award of the 12½ p.ct. bonus.

COALITE HISTORY IN BRIEF.

To give the history of the Coalite Companies in a single article in the "Financier" is hardly doing justice to it, though probably very convenient to compress it, as it saves the necessity of supplying many details as to the financial, technical, and commercial mess that constitutes so much of that history, and has not furnished the shareholders with dividends, but only so far with considerable losses and anxiety. It would have been interesting if the writer of the twelfth article of the series had mentioned the total sum that has been lost in this adventure in company promotion. He cites the chain of companies who "hold" and "operate" the Coalite "patents"—Coalite, Limited, the British Coalite Company, the Barnsley Smokeless Fuel Company, and Low Temperature Carbonization. The Eticoal Syndicate does not appear to be worthy of a place in the record. The writer of the article is true to the trust reposed in him. He speaks as though Coalite was the only low-temperature system in existence.

> The very earnest consideration that is now being given by the Government to the national importance of the Coalite products, and, indeed, the practical recognition accorded, portend big developments in the near future. If reasonable expectations thus inspired be fulfilled, then this Company and its associate undertakings should reap the reward that has been well earned by indomitable effort, but far too long delayed.

It is within our knowledge that the Government have also been giving "earnest consideration" to other low-temperature systems. The "practical recognition" by the Government, we suppose, refers to the putting of £10,000 into the Barnsley concern, which step was subsequently referred to in the House, when it was shown pretty conclusively that the Government had no intention to extend their patronage, because they found that the Coalite process would not serve the purposes which they had then in contemplation—the provision of materials for high explosives. The "if" before "reasonable expectations" indicates the foresight and the caution of the writer. "Reasonable expectations" appear to be easily inspired judging by Coalite literature.

There is an interesting feature about this particular article of the series. It ascribes much of the misery and misfortune of the British Coalite Company to this—

> On the very day the prospectus of the British Coalite Company appeared, "The Times" and other papers also contained an advertisement of what purported to be a new smokeless fuel, which portended very serious competition by powerful interests.

> The immediate result was that the underwriters were scared, and withdrew their commitments. They can scarcely be blamed in the circumstances, for it naturally seemed to them a grave risk.

This, it is stated, caused a temporary wreckage of Coalite prospects. It is asked, "Where is the vaunted smokeless fuel now?" And then the remark: "Its producers with their large capital and mechanical resources might surely have persevered if they were confident of their ability to beat Coalite out of the field in fair and open competition; but, for some unexplained reason, the enterprise was allowed to lapse after it had caused a temporary wreckage of Coalite's progress." Surely the Coalite Company, who had not ceased their endeavours, boasts, or claims might have beaten all such aspirants out of the field in open competition. But they did not. The reason for the disappearance of the competitors with fuel containing a higher percentage of volatile matter than ordinary gas coke was that there was not a sufficient public demand for it at the higher price that had to be charged for ordinary coke and in competition with household coal at then prices. The Coalite Company know this to be the reason as well as we do. Yet prior to this nonsense in trying to place upon competitors the primary cause for Coalite misfortunes, the article states that, from the experimental plant at Wednesfield, "such excellent results were obtained that it was decided to form the British Coalite Company." If this be true, why the "temporary wreckage of Coalite's progress." "Temporary!" Yet this happening dates back some nine or ten years! The "temporary" wreckage seems to have been of somewhat long duration. But notwithstanding the "excellent results" at Wednesfield, the article tells us that, when the system was installed at Barking—another of the graveyards of Coalite hopes—it was found that cast-iron retorts were radically unsuitable; they buckled, and became semi-porous. It had taken a considerable time to ascertain this; for Barking after Wednesfield was not the only place where cast-iron retorts were installed by the Coalite Company on a considerable scale, and always with a beating of the big drum. Cast-iron retorts are quite suitable for true low-temperature carbonization; but the fact of the matter is that the temperatures adopted by Coalite have been rising from the initial stages. Hence the adoption of fire-clay—the same as in gas-works practice. Now it is stated that the plant at Barugh, near Barnsley, may be seen in "perfectly satisfactory" operation. It was not long since that, at the annual meeting of the Company, the Chairman referred to stoppages and difficulties at Barugh. Coalite has in its day had a good many quick transformations.

There is one real national service that Coalite has done. It was the means of having some Germans interned; and for this it has our gratitude. Let the article tell the tale:

> When the fortunes of the Coalite group seemed at their lowest ebb—that is to say, in 1912—German interests showed more faith and enterprise than financiers and industrialists of this country; and they sent over representatives to investigate. These early in 1913 undertook to enter into a contract for the erection of low-temperature plants throughout the United Kingdom and on the Continent—provided they were permitted to have a year's tests. When the tests were completed and acknowledged to be satisfactory, the German interests sent over a large staff of draughtsmen, engineers, chemists, and other experts for the construction of the Barnsley plant. That was just before the war broke out; and the outbreak of hostilities made them enemy aliens, with the result that they were interned. From a patriotic standpoint that was good business; but it deprived the Coalite companies of the handsome royalties contracted for. Nevertheless, the German industrial invasion showed the estimation in which the Coalite processes were held by Continental experts and financiers; and the Barnsley works were proceeded with. There, profiting by the mistakes and disappointments of the past, the pioneers have achieved such success as has assured the co-operation of important financial interests that are now bent on realizing one of the most momentous revolutions our industrial history has known.

It is the same old Coalite drum that exists to-day.

Modern Developments in Gas-Works Construction and Practice.—The discussion on Mr. Alwyne Meade's paper before the Institution of Civil Engineers [*ante*, p. 502] was concluded last Tuesday; closing with a speech by the President (Mr. H. E. Jones). Those who took part in the discussion were Messrs. Henry Woodall, Charles Hunt, Thomas Glover, Thomas Goulden, Stanley H. Jones, Samuel Glover, G. M. Gill, C. E. Jones, and J. G. W. Aldridge.

The British Engineers' Association.—At the sixth annual general meeting of the Association, the President (Sir Wilfrid Stokes), in moving the adoption of the report of the Council, referred to the growth of the work of the Association—particularly in relation to the obtaining of inquiries from Overseas, the issue of the Association's Directories, and the numerous services rendered to individual members. The new President is Colonel Armstrong, D.S.O., Chairman of Messrs. Greenwood and Batley, Ltd., of Leeds; while the other members of Council include Sir John Hunter (Messrs. Sir William Arrol & Co., Ltd.), Mr. T. Cuthbert Stewart (Messrs. Stewarts and Lloyds, Ltd.), and Mr. J. C. Ward (Messrs. Edgar Allen & Co., Ltd.). Various other Associations are represented on the Council; Mr. George Clark of the Bryan Donkin Company, Ltd.) acting in this capacity on behalf of the Society of British Gas Industries.

ELECTRICITY SUPPLY MEMORANDA.

THERE is more than one electro-culture muddle in the electrical industry. With all the electro-culture of men's brains for the purpose of making them efficient electrical engineers, they do not all seem capable of completely compassing the points of a question before coming to a decisive opinion upon it. For example, they talk lightly of uniting coal carbonization with electricity generation, in addition to the extensive coal carbonization plants already in existence; but no one can tell if this would pay, or if the secondary products yield would not so assist to overbalance market conditions that, instead of diminishing the cost of generation, they would increase it through hopes as to values not being realized. They talk of huge generating stations and long-distance transmission systems; but no one seems to have calculated the cost of transmission (including the expense of transporting the secondary products of coal carbonization) in relation to the transmission of other agents, even of coal. They ramp, too, over the question of utilizing electricity for intensifying the production of food. No electrical engineer can yet tell us whether the electrification of crops will, even if it actually hastens or stimulates them, have any detrimental physiological action upon them. An eminent physician, writing recently in "The Times," says: "The problems are highly complex; the sources of fallacy are numerous. Even should it be proved that the electrification of crops or seeds does hasten their growth or increase their immediate productiveness, it will still have to be shown that with mere increase in bulk there is no deterioration of quality, impairment of fertility, or diminished resistance [of the crops?] to disease." These things, however, do not trouble electrical advocates. It is a pity they do not look at all sides of a question and the possibilities before beginning serious advocacy.

Complete Compassing of Considerations.

The Lesson of an Accident.

Again, in the matter of huge concentrations of generating plant, there has been occasional allusion to, but not a general electrical recognition of, the danger in time of war—particularly in these days of fast-speed and heavy bomb-carrying aircraft—of such schemes. We are hoping for a permanent peace after the war. But who can tell what will happen with mundane affairs in the hands of men with different aspirations, and different views as how best to attain them? Anyway, it will never do for any nation to again be found unprepared for war; and among the preparations must be a sound defensive system in the country. Let us suppose that munition works depended for power upon the proposed huge concentrations of electric generating plant, what could be more to the taste of an enemy at war than to have such concentrations for objectives in their bombing expeditions? A few well-placed bombs might cause an immense delay or reduction in the production of munitions. It does not seem to require so much as the bursting of a bomb to cause a dislocation and interruption of work over a large area depending upon a single electrical station for power. Under the side heading of "Bonnybridge," the "Electrical Review" reports that the bursting of a large cast-iron pipe at the works of the Scottish Central Electric Power Company caused serious dislocation of work in Stirlingshire and Linlithgowshire. Over an area of about 400 square miles, labour in a large number of iron and steel works, brick-works, and collieries was entirely suspended. In a number of the steel works, the furnaces (which were fully charged) cooled, necessitating the blasting of the solid contents. That cast-iron pipe has supplied a good piece of testimony as to the danger of large electrical concentrations; and perhaps it will be of help in making the concentrationists see that their plans have another and an important side. Assuming (without admitting) that there is economy in their plans, the production of the economy may possibly be accompanied by risks which may some day produce not merely a temporary peace-time industrial disaster, but a war-time national one.

The Report and Unfair Criticism.

An "Occasional Contributor" to the "Electrical Times" is, like many other electrical men, concerned over the effect that the report of the Coal Conservation Sub-Committee of the Reconstruction Committee may have upon people who are not in the actual know, and so cannot appraise the report at its true value. There is no doubt that the report would lead the casual lay reader to think that the members of the electrical profession are all mad or incompetent, with perhaps an exception on the North-East Coast. The big cities, for example, have placed stations in unsuitable positions, apparently because by this means the rateable value came into the owning towns themselves. The contributor to our contemporary is of opinion that such criticism will affect the interests of electricity supply when it comes to election speeches. It will make a nice tit-bit for candidates for municipal honours to be enabled to quote the authority of a Committee which has been at work under the ægis of the Ministry of Reconstruction, and has received the blessing of Lord Haldane for the beneficent work that it is supposed to have done in pointing to a serious leakage in national wealth through the misuse of coal. The new critic opines that those who form the thinking part of the electorate will each say: "Just

what I thought," and will proceed to urge that as Manchester, Birmingham, and Sheffield cannot run electricity concerns on business lines, they had better agree to be transferred to companies, which is just what would, of course, coincide with the views of Mr. C. H. Merz and those who side with him. There is a point which the critic urges should be placed before those who may be impressed by the report, and who may allow it to fan into a flame their smouldering antagonism to municipal electricity supply. It is that the capital of municipal electric undertakings is being wiped-off by sinking fund and repayment, and depreciation is being well looked after. Consequently, this will put them in a position that in the course of a few years will knock the power companies out of any financial comparison. There is nothing much that can be said favourable for the large power companies now in existence, excepting it be the North-East Companies; and even in that direction there are those who say "it is not all gold that glitters." But this is a matter over which one cannot generalize. Those municipal concerns that are doing well in building-up financial stability are those in especially favoured areas, and they are the envied of less fortunate contemporaries, some of which have no funds worth speaking of, and have to look to the ratepayers' purses to keep them from destruction. We are not lovers of municipal trading; but we are of fair dealing. Therefore, condemnation that unfairly assails municipal electrical professional ability will not find us friendly, even though it comes from a company quarter.

Increased Charges and the Small Unit.

In a leaderette last week mention was made of the importance of small units when making increases in charge, especially in times like the present. In the "Memoranda," too, there have been references to the fairness of spreading the existing special war time costs over all classes of consumers, and not lumping them upon any single class, and excluding others. The increase should apply to long-term contract consumers, as well as to others; and electricity suppliers have the concurrence of the Ministry of Munitions in this being done. The Worcester Electricity Department finds that its increased annual cost of production is about £7000. The Committee have, of course, increased the price of current to ordinary consumers; and now they have asked the authority of the Council to advance by ¼d. per unit the price of energy to the consumers with whom they have contracts. Under these contracts, apparently the consumption is not more than 1,920,000 units; but the ¼d. per unit, which will not strike the consumers as being an enormous increase, will produce £1000, which is worth having in these times. If the Committee made the same advance at per 1000 units (we are not suggesting that 1000 units are only worth 1000 c.ft. of gas), they would have to talk of an advance of 10s. 5d. This shows that the small unit has a commercial value when it is a question of making substantial advances through heavy augmentations in the costs of production.

Relative Positions.

It will be remembered that recently the City Editor of "The Times" was sympathetic over the efforts of gas companies in applying to Parliament for some amelioration of the conditions of the stock and share holders in these days of stress—more particularly in view of the extraordinary depreciation of dividend and capital values through the working of the statutory sliding-scale, which was constructed on peace-time terms. "Electrical Industries," while not objecting to the sympathetic attitude, says that the shareholders in electric supply companies would be only too glad to have "'arf the complaint of the gas shareholder." We venture to doubt whether they would like the portion of gas shareholders in these days of (in so many cases) the slackened inflow of cash into the private purse, with the increased heavy outgoings. We are glad that the writer explains what he means. It seems that the electrical "complaint" is nothing new. It is the aged question of expropriation. There is, he remarks, no approximate equality between an undertaking with permanent tenure and one with limited tenure, and liability to expropriation at an unknown "then value" of the plant without any allowance for goodwill, future profits, or any other consideration whatsoever. Expropriation of electricity concerns is not a product of the war; it is not influenced in any way by the war. It is something that existed at the time the shareholders originally put their money into the concerns. The war conditions that have knocked all shape out of the terms on which the gas companies' sliding-scale was founded did not exist when, on its inducements, shareholders invested their money in gas undertakings. Still another error of our electrical contemporary is that "the sliding-scale restriction on gas undertakings moreover is matched by the maximum prices imposed upon electric supply companies." How can this be when the price of electricity can be raised right up to the maximum, and, if finances will allow, the old dividend can still be paid. In the case of the gas companies' sliding-scale, every penny increase in price brought about by war conditions has ripped another slice off the dividend, which process has been going on with such frequency that in some cases the dividend has now reached quite a diaphanous state. Anyway our contemporary is persuaded that, so far as external conditions are concerned, "the gas companies are immeasurably better off than the electric supply companies, which have never been sanguine enough to hope for anything so wonderful as permanent tenure." Despite all the strategy of the electricity industry to nullify this permanence, the position of the gas industry as an indispensable factor in the country's system and operations has hardened immensely. But the position must be supported by attractive capital and by a sound dividend-earning capacity, which the sliding-scale denies in these times when the contrary is more than ever required. We have been looking at some of the dividends that are being paid by the London Electric Supply Companies. What a difference there would have been in them if they had been under a sliding-scale!

The Workman and Electric-Heaters.

In connection with the Chadwick Lectures on "Electricity and National Progress," Prof. H. T. Davidge is still moving round the country talking in some respects of electrical ideals unattainable in practice. He has been at Swansea; and there he has been good enough to throw in a word for gas heating "as a matter of economy." But his main advocacy is electrical. All advocacy should have a logical basis. We quite agree that electricity can contribute to healthy conditions by enabling the homes of even the humblest workers to be placed in healthful surroundings far from the fumes of the factory by making the fullest use of the possibilities of electric traction. But then Prof. Davidge suggests that, by lighting and heating the homes electrically, the most healthy conditions may be maintained, though "in some cases" electric lighting might be combined with heating by gas, as a matter of economy. Thus economical gas is in the working man's home to take second place to electricity as the heating agent, where, apparently, electric heating is beyond the capacity of the purse. Let the Professor just ask himself the question, How is any working man (excluding munition workers in time of war) to afford electric heating? There have been great complaints of the inefficiency of electric-heaters as room warmers. The electrical answer has faithfully been that the fault has been through expecting small-sized heaters to do too much work, and therefore the requirement is a three or four kilowatt heater. In his congenial country retreat, the working man cannot afford to pay for 3 or 4 units per hour to heat a single room. By the end of a cold week, he would find his electric bill for heating would absorb perhaps half or one-third of his wages; and at present prices of current in some areas (where the user is not a munition worker), he might find that he would have no money left for the ordinary necessaries of life. Now in addition to economy, if Prof. Davidge had stated that the modern gas-fire was a health promoter through its ventilating agency, he would have added to our gratitude for the little that he did say concerning gas—that is, judging from the abstract of the lecture to hand. If, too, he had shown how the use of gas means a nationally valuable application of coal through the many important derivatives from its carbonization—this in a way elec' 'city does not match—he would have said something that would have greatly enhanced his lecture. If Prof. Davidge would like to enter into these matters with us, there will be delight on our part. We are always open to be convinced if the evidence is strong enough, as well as to help to carry conviction to others where it is obviously required.

Masonic—Murdoch Lodge, No. 3480.

The Annual Festival of this Lodge was held last Thursday at the Imperial Hotel, Birmingham, when the S.W. (W. Bro. Luke B. Taylor) was installed W.M. by the retiring Master—W. Bro. Harold G. Eveson. The officers invested were:

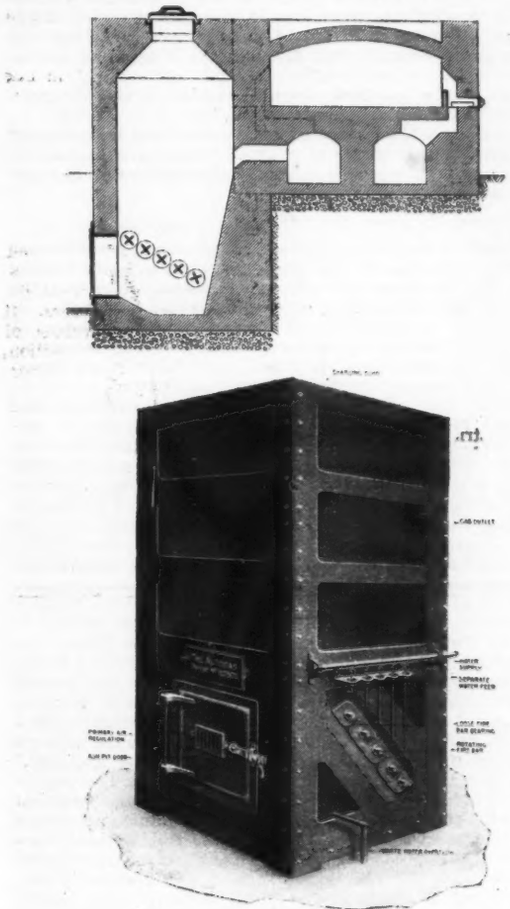
W. Bro. W. J. R. Baker	S.W.
Bro. H. J. Woodfine	J.W.
W. Bro. R. J. Milbourne	Chaplain.
W. Bro. Fred Vale	Treasurer.
Bro. Frank Jervis	Secretary.
W. Bro. Vincent Hughes	Charity Steward.
Bro. W. M. Valon	S.D.
Bro. Forrester Clayton	J.D.
W. Bro. S. O. Stephenson	D.C.
W. Bro. W. A. Sapey	Assist. D.C.
Bro. H. V. Stanton	Organist.
Bro. Lieut. Robert Scott	Assist. Secretary.
W. Bro. P. B. Rider	I.G.
Bro. Robert P. Vale	Stewards.
Bro. Lieut.-Col. W. R. Glover, D.S.O.	Stewards.
Bro. J. R. Duff	Stewards.
Bro. W. H. Johns	Stewards.

Restrictions in the Use of Gas and Electricity.—All communications on the subject of the restrictions in the use of gas and electricity should be addressed to Mr. Garnham Roper, C.B., Assistant Secretary, Board of Trade, No. 7, Whitehall Gardens, London, S.W. 1.

Atmospheric Pollution.—Dealing with the subject of the "Measurement of Atmospheric Pollution," in a paper before the Royal Meteorological Society, Dr. J. S. Owens said the era was past when a harmless gas like carbon dioxide was taken as a measure of impurity; and dust and dirt were now recognized as the really important things, causing great waste of human life, and also of fuel, light, and other necessities. As showing the kind of air that city dwellers were sometimes forced to breathe, he cited the following figures of deposits from the air for one year, April to March, per square mile at the following places: Oldham, 950 tons; Manchester, 635 tons; London, 453 tons; Sheffield, 395 tons; Malvern Wells, 56 tons. Evidence existed, he added of a general reduction of atmospheric impurity during the winter of 1916-17 as compared with the preceding one—probably due to the reduced consumption of raw coal.

WRIGHT'S "AUTOGAS" PRODUCER.

The extent to which furnaces fired with coal gas have displaced those using hard fuel is, of course, well known both to furnace-users and to the makers of such appliances; but now it has been felt by Messrs. John Wright & Co., of Birmingham, that, with the necessity for still larger furnaces, and the difficulty of maintaining a sufficient gas supply for all possible requirements in some areas largely occupied on munitions, some other means of providing a fuel gas is essential. They have therefore designed expressly for furnace work the "Autogas" patent producer, to use gas coke; and it is, so far as they know, at the present time the only apparatus for the purpose possessing such simplicity and convenience of working. Those undertakings which are now experiencing too large a demand for their gas and too small a demand for their coke will welcome this promise of securing a more equal state of affairs; while, of course, the linking-up in this way of the coal-gas industry with the manufacture of producer gas should be of great value in localities where coal gas is inaccessible. We agree with Messrs. John Wright & Co. that it would be a very good thing if the coke salesmen of the various gas undertakings would get into touch with them, so that a plan of campaign might be arranged with a view to introducing this gas-coke-consuming producer to the notice of manufacturers who would be likely users.



A Furnace-Producer Utilizing Gas Coke.

The "Autogas" producer possesses special features, which have been commended by practical engineers who have seen and tested it under daily working conditions. The rectangular-shaped cast iron and mild steel generator (which has no parts to get out of order, so that the cost of repairs is negligible) is internally lined with fire-brick. The fire-bars are of a special × section, with circular ends which fit into bearings. The turning of the bars from time to time with a hand lever cleans the fire, and breaks-up any formation of clinker there may be, thus doing away with any chance of stoppage in gas making from this cause, as well as avoiding possible damage to the producer by poking. For each fire-bar a separate water supply is arranged; the water being maintained in the uppermost groove of the bar, in direct contact with the fuel, thus providing the steam required for the production of gas, and at the same time maintaining the bar at such a temperature as ensures for it an indefinite length of life. Any particular bar can be removed for inspection when desired, without disturbing the others. The producer requires charging with fuel only once in three or four hours, so that the attendance required (and that need not be skilled) is but little.

As to the product, Messrs. Wright & Co. state that, owing to the highly efficient method of water evaporation at the fire-bars, the gas evolved is of a specially high calorific value, and this value is maintained by a bed of fuel of certain defined thickness always being above the gas-outlet ports. What they suggest as the ideal arrangement with large furnaces, is to have an "Autogas" producer built in the furnace-body, as thereby all sensible gas heat is utilized, and the most efficient working conditions are ensured. For smaller installations, one producer can be adapted to serve two or more furnaces—such adaptation usually calling for only slight alterations. The "Autogas" is made in several sizes, the smallest giving a maximum output of 4000 c.ft. of gas per hour; and with it there is said to be no difficulty whatever in constructing glass-melting furnaces to work at from 1200° to 1400° C. For angle bar, plate, annealing, re-heating, and normalizing furnaces, &c., temperatures of from 350° to 1100° C., according to design, can be obtained. Under ordinary conditions, where a chimney is available with a reasonable "pull," no induced draught is necessary. Indeed, simplicity and economy are apparent in all features of the apparatus.

For particulars as to the use of this furnace in the glass-making trade, reference may be directed to a paper [see pp. 586] read last Wednesday at Newcastle-on-Tyne by Mr. A. B. Roxburgh, the patentee.

SIXTY YEARS AGO.

From the "Journal" for March, 1858.

The Phœnix Gas Company.—The Phœnix Gas Company was established in 1824 for lighting the borough of Southwark and all the southern parts of the Metropolis; and the ramifications of the Company were gradually extended until several hundred miles of mains were laid down. Ten years after the establishment of the Phœnix Company, the district was invaded by the South Metropolitan and the London Gas Companies; and in 1849 the Surrey Consumers' Company was also formed to light a portion of the same district. Thus there were four companies, with mains running side by side along many of the streets, and under the foot-pavements; and if competition be advantageous to gas consumers, they had full experience of it in the struggles of these rival companies to obtain their custom. It is, indeed, always pleasant to be courted; and during the "reckless race of competition," the consumers were, no doubt, much pleased to be solicited for their custom—to be allowed to burn gas a whole fortnight for nothing, as a bribe to obtain it—and to be able to indulge a desire for change, so as to try three sources of supply in the course of a single year. This state of things must have been agreeable, so long as it lasted; but it was quite evident that it could not endure long, for the shareholders of public companies have some more substantial object than the Quixotic design of tilting with rival competitors for the benefit of the public, who, in such cases, laugh at the folly, while they reap the advantage, of the contest.

The axiom of Mr. Robert Stephenson—that where amalgamation is possible continued competition is impossible—is equally applicable to other public undertakings as to railway companies; and though the reckless race of competition may be kept up until either the patience of the shareholders is exhausted or one or other of the competitors is ruined, it must eventually terminate, and the sooner the better for the substantial interests of the public, as well as of those whose property is being sacrificed. The present gain is generally but the forerunner of future loss; and when the race is ended, either by compromise or ruin, the public, who thought it good sport for the time, have often to pay the damage in increased charges which the losses incurred have rendered necessary. Fortunately, however, for the gas consumers of the southern part of the metropolis, the compromise was effected in time to prevent them from experiencing disadvantage from the previous losses, and in the district assigned to the Phœnix Company the consumers are now much better supplied than they were during the time of competition. They do not, it is true, enjoy the pleasure of being assiduously courted by four companies for their favours, nor are they permitted any longer to burn gas for nothing. But the quality of it has been greatly improved.

Increased Output of Natural Gas.—Statistics compiled for the United States Geological Survey show that the volume of natural gas commercially utilized in the United States in 1916 was greater than that so utilized in any other year in the history of the natural gas industry. The quantity used amounted to 753,170,253,000 c.ft., and exceeded by nearly 125,000,000,000 c.ft. (or 20 p.ct.) the record established in 1915. The proportion of natural gas supplied to industrial consumers in 1916 was 4 p.ct. larger than in 1915.

Proposed Association for Refractories Research.—The Provisional Committee appointed to draw up a scheme for a proposed Association for refractories research has (it is announced in the March 15 number of the "Journal of the Society of Chemical Industry) now drafted a preliminary prospectus, in which is outlined a suggested constitution for the proposed Association. In drafting the prospectus, the Committee has been in consultation with the Department for Scientific and Industrial Research; and it now proposes to lay the scheme before a selected number of firms and individuals interested in the subject and likely to become members of the proposed body.

GAS COMPANIES AND INCOME-TAX.

By George Rogerson.

A close study of the law of income-tax, reveals to the student many complex, and at the same time interesting, problems. The constant increase in the rate of income-tax charged has made the question one of much importance to accountants, secretaries, and all those who have to do with the accountancy branch of an undertaking.

Bank Interest and Deduction of Income-Tax.

Considering the prevalence which this method of borrowing money has obtained the last few years, the law relating to the subject is not so well known as it deserves to be. Many companies—and, in fact, individuals—make accommodations of this kind; and seldom a thought is given as to whether or not these should stand on a par with an ordinary loan. To thoroughly understand this problem, there are two main features which must be borne in mind when borrowing money from the bank.

When may Tax be Deducted?

The first is that bank interest may be paid out of profits which are subject to tax, or out of money—*i.e.*, capital—not subject to tax. The second is that bank interest may be termed annual interest, or it may not come within the meaning of the term. Having enumerated the main provisions to be borne in mind, and in order that the reader may easily understand the meaning, the following illustrations should be carefully noted.

(1) A company, in order to create a good coal reserve, arrange with their bankers for a temporary overdraft up to £3000 at 1 p.ct. above bank rate.
(2) A company, in order to pay off certain loans falling due, borrow from their bankers £3000 at 5 p.ct. interest per annum. The sum to be repaid at the end of six months.
(3) A company, awaiting calls on an issue of shares, need a temporary loan of £6000, and arrange with their bankers for the sum at ½ p.ct. above bank-rate. The sum to be repaid at the end of three months.
(4) A company, in lieu of issuing new capital for extensions, borrow from their bankers the sum of £6000 at the rate of 5 p.ct. interest per annum. The loan to extend over a period of three years.

The four illustrations having been carefully read, it has now to be seen which may be treated as a charge against profits subject to tax, and which are to be treated as a charge against money not subject to tax. The law on this subject may be easily understood by an appeal to business experience. It is a rule—and the law is very definite upon this point—that no expense shall be set against profit unless it is incurred in actually earning the profit. Interest paid on an overdraft required by the exigencies of the actual trading may be charged against profit. It will therefore be seen that the first illustration is the only one which may be charged as a trade expense. The last three illustrations are a charge against money not subject to tax, as interest paid in return for the capital a company find it necessary to borrow is not a trade expense within the meaning of the Income-Tax Acts.

Consideration must now be given to the question of when may income-tax be deducted from interest paid to the bank. The Income-Tax Act clearly states that the tax may only be deducted when the interest is "annual." The length of the periods over which the instalments of interest are paid is immaterial; and the fact that interest is calculated at a certain rate per cent. per annum does not make it annual. The whole question therefore resolves itself in a clear definition of the word "annual." More often than not, it happens that the rate of interest fluctuates with the bank rate, or the amount of money varies according to the requirements of the borrower. Fluctuations of this kind have the effect of removing the interest in question outside the term "annual interest," which ruling has been upheld in cases which have come before the Courts.

On examination of the four illustrations cited, we find that Nos. 1, 2, and 3 are not subject to a deduction of income-tax when paying the interest, as they do not come within the term "annual interest;" and only in illustration No. 4 may income-tax be deducted from the interest when making payment to the bank. The reader will readily appreciate the importance of this subject from a business point of view, as it will be seen:

(1) That in most cases the law operates in favour of the banker.
(2) That in arranging loans with their banker, a company should consider whether the interest will come within the meaning of the term "annual interest."

Free of Tax Dividends.

The issue of shares at a fixed dividend, "free of income-tax,' has, in the past, been widely adopted by gas undertakings. While this class of security is very attractive to the investor, war conditions have made them very costly to undertakings. In these cases, the tax is paid by the company. The expression "free of income-tax" is somewhat contradictory, and should not be used. As a matter of fact, it should be: "The company pay tax on the dividend." The company, in any event, pay tax on their profits, which include the dividends paid. From a financial point of view, these issues are anything but sound finance on the part of an undertaking, and where shares are issued bearing a fixed rate of interest, income-tax should always be deducted.

Take the case of a company whose Special Act provides for an issue of preference shares, which must bear a rate of interest not exceeding 6 p.ct. per annum. If the company issued preference shares bearing a rate of interest at 4 p.ct. per annum "free of income-tax," the present value of £100 is as follows:

Interest on £100 at 4 p.ct. per annum	£4	0	0
Add tax at 5s. in the pound	1	6	8
Total	£5	6	8 or = to 5¼ p.ct.

Supposing the income-tax is increased to 7s. 6d. in the pound, the value of £100 would be:

Interest on £100 at 4 p.ct. per annum	£4	0	0
Add tax at 7s. 6d. in the pound	2	8	0
Total	£6	8	0 or = to 6⅔ p.ct.

This shows that the company would be paying a dividend in excess of the statutory powers.

Similarly, on ordinary shares, many gas companies have been in the habit of paying the full statutory dividend "free of income-tax." This procedure is illegal, unless the tax is paid in the form of back-dividend. Take the case of the *Ashton Gas Company v. Attorney-General*, the House of Lords had to consider whether or not the shareholders were entitled to receive their dividends "free of income-tax." The Lord Chancellor observed that "the Legislature had enacted that shareholders should not receive more than 10 p.ct. as profit on their undertaking; and any amount paid as tax by the Company should be inclusive, and not exclusive, of the amount payable for the year."

It will be seen that every increase in the rate of income-tax charge means a greater distribution of profits. Cases have also arisen, in this way, where a company have distributed more in dividend than was actually earned in profit.

Income-Tax and Hire-Purchase of Wagons.

The transit of coal—the raw material for the gas-works—has been a continual source of great anxiety to gas undertakings during the war. This is owing to the enormous demand made upon the available rolling stock belonging to the colliery proprietors. It is essential that more consideration be given to the purchase of wagons by the undertakings themselves; and, in this connection, many smaller undertakings could avail themselves of an opportunity to obtain wagons on the hire-purchase system.

The Income-Tax Authorities now grant as an allowance that part of the hire-purchase of wagons representing hire as contrasted with purchase. The scheme in force is that the difference between the initial value—*i.e.*, the price at which the wagons would have been sold for cash at the date of the agreement—and the aggregate amount payable under the agreement is to be treated as hire, and allowed in equal annual amounts spread over the full term of the agreement. Depreciation (about 5 p.ct.) is also allowed on the initial value from the beginning of the agreement.

Illuminating Engineering.

It will be remembered that in January, Mr. Leon Gaster, the Hon. Secretary of the Illuminating Engineering Society, and Editor of the "Illuminating Engineer," read a paper before the Society tracing the progress of illuminating engineering, and deducing from it lessons and guidance for the future. A decade is not a long span in any movement. But the past decade is the measure of the life of the Society and of the "Illuminating Engineer," and both have achieved considerable success during that period. If the same success attends them—and they have our heartiest wishes for it—during the coming years, illuminating engineering will become a science instead of the haphazard thing that it now is, subject, as it ever has been, to the whims and fancies of every man who touches it. The Society as well as our monthly contemporary (both of which are due to the initiative of Mr. Gaster, who has also from the first been very largely the guiding spirit) have filled a previously unoccupied place. They have both been instrumental in broadening knowledge on many of the subjects that combine to the making of scientific illumination. We cannot have illumination experts before we have the knowledge which enables them to perform their functions in a proper manner; nor without that knowledge can the highest economy and the highest true efficiency be attained. To these useful ends the Society and our contemporary have been devoting themselves; and we congratulate them upon their success. But the ultimate success does not depend upon their operations within their present limits. The specialist and all his knowledge are no good if the former is not consulted and the latter is not applied. Therefore, educational work is required beyond the bounds of the practitioners, in order to induce people to seek advice. This is done to a moderate extent; but compare the scope of illumination with present actual practice on scientific lines! The comparison tells a story. The last issue of "Illuminating Engineer" publishes Mr. Gaster's paper *in extenso;* and there are pages of appreciative messages regarding the work that has been done.

Mr. Alexander M. Chance, who was a Director of Messrs. Chance and Hunt, Ltd., and of the British Cyanides Company, Ltd., left estate of the gross value of £45,557.

RECENT DEVELOPMENTS IN THE GAS INDUSTRY.

Mr. Cotton's Dublin Lecture.

In last week's issue [p. 553] brief allusion was made to a lecture delivered by Mr. H. T. Cotton, the Distribution Engineer of the Alliance and Dublin Consumers' Gas Company, before the Engineering and Scientific Association of Ireland. Mr. Cotton has since sent us a copy of the lecture as originally prepared; and this will enable a fuller account of the latter portion of it to be given. It may be mentioned that the notes were considerably enlarged upon as the lecturer progressed, and a very interesting discussion ensued.

Fuel Resources of England and Germany.

After some introductory remarks, Mr. Cotton said: Prof. Braine estimates our coal resources at 186,153 million tons, and Germany's at 415,794 millions. He states that we are exhausting our stock at a far greater rate than our nearest commercial rivals; further, that the Empire possesses one-fourth of the world's coal resources and the United States more than one-half. It is estimated that 70 million tons of coal are used annually for industrial purposes. If it were possible to carbonize this at gas-works under present conditions, it would produce 840,000 million cubic feet of gas, which would give better results in thermal energy than the raw coal; and we would get, in addition, 35 million tons of smokeless fuel, 700 million gallons of tar, 825,000 tons of sulphate of ammonia, and, in addition, benzol and many other valuable bye-products that are derived from coal tar. How urgent, then, is this question to the country!

Fuel Research.

Mr. P. W. Everitt [Messrs. Armstrong, Whitworth, & Co., Ltd.] stated recently that by our barbarous methods of consuming our annual output of 280 million tons of coal, we lose 2000 million gallons of tar suitable for naval purposes, 300 million gallons of petrol suitable for motor vehicles, and 3 million tons of sulphate of ammonia.

The Government, realizing the importance of this question, last year appointed a special Board of Fuel Research, which is now establishing a Fuel Research Station beside the works of the South Metropolitan Gas Company. The first report of this Board brings home the part which the gas industry is called upon to take in the future of the nation. I would like to just refer to the following lines in the first report:

> The second of the proposed lines of inquiry has been led up to by a variety of influences during the past eight or ten years. Among these influences have been the demand for cheaper and more ample supplies of electrical energy, for home supplies of fuel oil for the Navy, of motor spirit for the Transport and Air Services, and last, though by no means least, for smokeless domestic fuel. This last has been brought about through the growth of public and municipal opinion on the subject of smoke prevention in cities and in industrial centres.
>
> The only development which would satisfy all these needs simultaneously would be the replacement of a large proportion of the raw coal which is at present burned in boilers, furnaces, and domestic fires, by manufactured fuels prepared from raw coal by submitting it to distillation.
>
> The greater part of the coal which is consumed in Great Britain is burned in its natural state as it comes from the mines. The question of the moment then is: To what extent can and ought the present use of raw coal to be replaced by the use of one or other of the various forms of fuel manufactured from coal—coke, briquettes, tar, oil, or gas. While there is already in the possession of experts a certain amount of knowledge and experience which might enable them to organize and direct schemes for the replacement of raw coal by manufactured fuel in particular directions and on a fairly large scale, no really comprehensive scheme can be formulated till certain perfectly definite problems in coal distillation have been solved.
>
> (1) Can the 35 to 40 million tons of raw coal which are used every year for domestic heating be wholly or partially replaced by smokeless fuel, solid and gaseous, prepared by the carbonization of this coal?
>
> (2) Can adequate supplies of fuel oil for the Navy be obtained by carbonization of the coal which is at present used in its raw form for industrial and domestic purposes?
>
> (3) Can supplies of town gas be obtained more economically and conveniently by methods of carbonization and gasification other than those at present in use in gas-works?
>
> (4) Will the more scientific development of the preparation and use of fuel, which would be implied in the successful working-out of the foregoing questions, enable the peat deposits of the United Kingdom to take a serious place as economic sources of fuel for industrial purposes?
>
> (5) Can electric power be obtained more cheaply if the coal used for steam-raising is first subjected to processes of carbonization and gasification?
>
> (6) Can the use of gaseous fuel in industrial operations be forwarded by the development of more scientific methods of combustion in furnaces, muffles, and ovens used in metallurgical, ceramic, and chemical operations?
>
> It is known, for instance, that the Admiralty attach great importance to the development of supplies of fuel-oil from home sources; so it may be taken for granted that this requirement alone would absorb all the oil which could be produced by the carbonization of millions of tons of coal per annum. This fact alone gives an entirely new aspect to the extension of carbonization in hitherto untried directions. But, while it will undoubtedly help on the economic side of the problem, it in no way relieves the pressure on the technical side. In a way, moreover, it accentuates the problem now to be referred to—the profitable disposal of the coke or carbonaceous residue left when the volatile products are distilled from the coal. The percentage of coke obtained varies with the quality of the coal and the temperature at which it is carbonized; but it may be taken, on the average, that each ton of coal carbonized will give about 15 cwt. of coke. Thus, to obtain one million tons of fuel-oil for the Navy it would be necessary to carbonize twenty million tons of coal; and the coke produced would amount to fifteen million tons.

Government Control of Gas.

I have often wondered if the Government did not lose an excellent opportunity in not taking over at the outbreak of war, in addition to other national services, the control also of the gas industry. Assume that, as far as possible, the price of gas was controlled and standardized throughout the country, the public gradually prohibited from burning raw coal, and forced to adopt either gas, electricity, or the smokeless fuel coke, where these are obtainable. Surely this would be a step in the right direction in saving transport and labour in the distribution of coal in small quantities, and would increase the output of the much-needed bye-products. The process would have to be gradual; and there are difficulties, but none of them insurmountable.

Gas of the Future.

I now return to the question, What is to be the gas of the future? In my opinion, it will be a low-grade gas of from 200 to 300 B.Th.U., supplied at higher pressure and costing about 6d. per 1000 c.ft. I acquired an idea about eighteen months ago of supplying a mixture of gas and air in certain proportions from the works at a pressure of some 10 inches, and putting in the remainder of the air required at the point of combustion. This was brought to my mind by the "Selas" system, which has met with success in lighting and heating in large factories. In this system, the gas and air are mixed in the proportion of two parts of air to one part of gas, compressed to 10 in. of water—the remainder of the primary air being taken in at the burner. But why do this at the factory? Why not do it at the works? Save half your coal consumption, double the capacity of the manufacturing plant, and get a more suitable, and just as efficient, gas at a cost of from 6d. to 1s. per 1000 c.ft.

Mr. George Helps's Proposal.

A system has been brought out by Mr. George Helps, of Nuneaton, who has obtained fourteen patents in connection with its manufacture. The scheme in some particulars is similar to the above, but very much broader in scope. On hearing of Mr. Helps's scheme, I went over to see him towards the end of last year; and I must admit that I am very much impressed and convinced that much more will be heard of his proposals.

Mr. Helps claims to have solved the problem of cheap gaseous fuel. As all his patents are not published, it is not possible at present to state in detail how the gas will be produced. He contends that gas can be manufactured and distributed in most towns to-day at from 1s. to 1s. 3d. per 1000 c.ft., and the quantity sold would then be quadrupled. In a few years, gas could be sold at from 3d. to 9d. or less, and would do all that gas is now doing and be used for steam-raising.

He claims that the present methods are all wrong, and that there are methods of obtaining 200 p.ct. more heat units for a penny on the basis of manufacturing costs, or three times as many heat units as are at present obtained—thereby saving over 60 p.ct. of the coal of the country. Further, he says a better duty will be obtained from the resultant gas. He affirms that gas in the immediate future will cost one-sixth of what it costs to-day, and that it will be used for all small steam-raising propositions and for nearly all household purposes.

"Pleno" Gas.

Mr. Helps has been dealing with the Government on this subject since August, 1916; and his proposals are at present being hotly discussed in the gas industry. By his process 85 p.ct. of the heat units are said to be exhausted from the coal in the form of gas; the labour necessary to handle the coal is one-fifth of that at present required; and the bye-products will be increased. To put his claim in brief, 60 p.ct. more work will be done with the same coal as we are at present raising and using industrially.

A ton of coal contains 30 million B.Th.U. Of this, 6 million are at present extracted as gas, and 24 millions are accounted for in residuals and loss in the process. The present process gives an efficiency of 50 to 55 p.ct. In the new process, it is claimed that eight times the quantity of gas will be made, four times the heat value in it, and the efficiency of the process will be 83 p.ct. The consumer will not only get three times as many heat units for the money he now spends, but it is held that the duty obtained from the use of the new gas is far higher than from the old. Mr. Helps has called his product "'Pleno' Gas," and the following are some of the points in connection with its manufacture.

A rich coal gas is manufactured in a certain way, by which the fuel oil constituents of the tar are increased by from 80 to 100 p.ct. This high-quality gas is mixed with a diluent (say, air), and the heating value is reduced to (say) 250 B.Th.U. It may also be said that the scheme aims at the complete gasification of the whole of the coal and coke. By a special process, the main pro-

portion of primary air is intermixed at the works, and this is the most important point. By this means, a coneless flame of high temperature and small volume is given. It is this short and intensely hot flame which gives the greatly increased efficiency. It is a question not so much of the value of the gas itself as of the temperature of the resulting flame from the mixture. One cubic foot of a completely self-combustible mixture of gas and air has practically the same heating value whether the gas be of 500 or 650 B.Th.U. The richer gas requires more air to completely consume it, and the poorer less air; but the value of the resultant mixture is about the same in both cases.

It matters not to the consumer whether he uses more of the poorer or less of the richer gas, so long as he pays for so many heat units.

Mr. Helps offers to prove his claims by demonstration to anyone who is interested. He states that preliminary agreements have been signed by some of the largest gas undertakings, and anyone who has met Mr. Helps will realize the meaning of enthusiasm and enterprise.

Measurement.—The Venturi Meter.

Before leaving the developments which are taking place in the world of gas, I would like to mention the question of measurement, which is becoming of more and more importance every day. The demand for an accurate and reliable instrument of measurement, and for such instruments to deal with very large volumes of gas, is one of our most pressing questions. I believe the future will bring a much simpler form of measurment than the present complicated mechanism used for measuring gas.

The Americans already claim to have produced a perfectly accurate and compensating "Venturi" meter for the measurement of gases, which can be constructed in all sizes and which is simple, reliable, and not costly. Another recent development is a "shunt" or percentage meter introduced by the Gas Meter Company, in which a percentage of the total volume of gas passing through a known orifice is accurately measured, and the rate of flow recorded. There are many other matters on which I would like to touch, but the scope of this paper does not permit of it.

The Gas and Electricity Industries.

Before closing, I would like to say one word to my friends in the electrical industry. I believe the time has come for gas and electrical engineers to combine their energies for the common good and to put their cards of knowledge on the table. There is a sphere of usefulness for both; but combined effort is now essential. If gas engineers exploit gas by depreciating the value of electricity, it will avail them nothing in the end, and *vice versâ*. There are definite problems for both; and these will be most easily solved by united effort. Our united efforts should be in the cheapest production and distribution of energy in the form which best suits a particular user's requirements.

A GAS-COKE-PRODUCER-FIRED TANK-FURNACE FOR THE PRODUCTION OF WHITE GLASS.

By A. B. Roxburgh.

[From a Paper read before the Glass-Makers' Society at Newcastle-on-Tyne, March 20.]

One of our greatest national assets is our coal; and upon the proper use or misuse of this commodity will depend, to no small degree, our future national prosperity and well-being. The problem, therefore, facing everyone in any way responsible for the use of coal, is how so to consume it as to prevent further depletion of the national wealth of our country.

The fuel almost universally used in all forms of glass furnace is bituminous coal—that is, coal which, when distilled, yields gas, coke, and bye-products, such as sulphate of ammonia and tar. From this last are prepared so many things, ranging from fuel oil for the Navy, light hydrocarbons for use in motor vehicles, in high explosives, and in the chemical industry, to the thousand-and-one derivatives that crowd the chemist's laboratory and the apothecary's shelves. When, however, this bituminous coal is burned for heating purposes, either in direct-heated furnaces or in an ordinary producer, the only residue is ash—a substance generally costing a not-inconsiderable figure to get rid of.

There are purposes, of course, for which a non-bituminous fuel can be used (directly-fired); but this does not apply in glass manufacture, except to a small extent in the lehr, because a long flame is necessary to ensure the equal distribution of heat. A non-bituminous fuel in a direct-fired furnace would give far too local a heat, and probably require too much draught; and so, following the line of least resistance, the best gas-producing coal that can be procured locally is generally used.

This was the position at the outbreak of war, and it still obtains to a great extent. But, as in many other walks in life, a radical alteration has been found necessary since the war. I am inclined to think that sooner or later there will be legislation making it illegal to use bituminous fuel in any furnace or for any purpose, unless it can be demonstrated that a non-bituminous fuel is unsuitable.

These were the lines of thought that I had in my mind when I first discussed with my friend, Mr. Ferry, the suitability of gas-coke for glass furnaces. He allowed me to inspect his furnaces; and I immediately saw that to fire with coke in a direct-heated furnace would be quite useless, and that the only way to effect the desired result would be first to gasify the coke in a producer. I took steps to get this tried in a producer as ordinarily constructed, in which good steam or non-coking coal is used. I found, however, that, owing to the unsuitability of the ordinary producer, trouble immediately ensued, and the experiments had to be abandoned.

Concurrently, Mr. Ferry was experiencing considerable trouble in obtaining pots, and also with their breaking. So the question suggested itself whether the pots could be entirely dispensed with; and (as this would entail direct contact between the gas and the metal) whether, provided a perfectly clean gas of constant quality could be obtained, this would have no deleterious effect upon the metal.

In order to prove this, a small experimental tank-furnace was constructed, which was heated by ordinary town's gas. The gas was supplied at ordinary town's pressure, and the air necessary for its combustion was supplied from a rotary compressor at 2 lbs. per square inch pressure. The flame was caused to impinge directly on the metal; and no resultant discoloration whatever of the glass was perceptible.

After much discussion, it was then decided to construct an experimental tank-furnace to be heated by a gas-coke-fired producer. Special precautions were taken to ensure that no dust from the producer should be allowed to reach the glass; that the producer should be of the simplest possible construction; that the attention necessary should be the minimum; and that the whole should work under natural draught without the use of even a steam-boiler.

A producer is really a very simple thing; but, like most other forms of apparatus, it is liable to cause a good deal of trouble, unless proper precautions are observed in the design and construction. For instance, ample means of absorbing the heat generated in the primary combustion zone must be provided by the chemical dissociation of water vapour, in order to avoid the formation of hard clinker; and, for this purpose, there must be proper means of producing the necessary water vapour. Also, as continuity of operation is a prime necessity, some ready means are necessary to remove the ash and any clinker.

As the plans progressed, it was seen that the scheme might have very important results in the glass industry and many others; and so patents were sought and obtained for the means of vaporizing the water, cleaning, &c., and for the removal of dust from the gas.

In the special type of producer evolved [see *ante*, p. 583] the bars are of cruciform section, and placed horizontally, but on an inclined plane. The bars in the smaller size are of a special construction which has been found peculiarly effective. Whichever section of the cruiform bar is uppermost forms a water channel; and each bar can be rotated separately by means of its outward projecting ends. It will also be observed that it is an extremely easy matter to remove ash, and break-up any clinker, by simply turning the bars round. It is interesting to note that, as the bars are water retaining, the hand can be placed on them without fear of burning, when the furnace is in full operation.

The water is fed to each bar by a separate pipe under control; and the whole is fed from a constant-level tank provided with a ball-valve. Water evaporation is exceptionally high; and there is always good direct contact between the fine ash and the water. In actual operation it is found that the front bars evaporate considerably more water than the rear ones; and the correct method of setting the tap is to see that from each bar the water drips a little—enough to keep the water-level in the ashpit fairly high.

The outlet for gas is placed low down in the side wall, by which means a fourfold purpose is served: (1) The fuel-containing capacity of the producer is unusually large—all the space above the gas outlet being so employed. (2) The height of the bed of incandescent fuel remains constant; as the incandescence cannot extend above the gas outlet. (3) Much of the dust which in ordinary producers is usually carried away in the gas remains in the producer. (4) The necessity for frequent fuel-charging is obviated. In practice, these advantages are found most valuable.

After the gas has been made, it passes through a dust-collecting chamber. The diminishing rate of travel of the gases which is provided for, causes the deposit of the dust on the large internal surfaces. The amount of dust actually collected amply proves the necessity for this dust-collecting arrangement. The dust-chamber should be cleaned out about once a month through the door provided; and, after the dust has been extracted from it, the gas is led to the furnace for combustion—the requisite amount of secondary air being admitted.

Where furnaces of this type are constructed, recuperation of gas becomes unnecessary; the whole of the sensible heat being utilized. The recuperation of the secondary air is a very important matter, on account of the temperature necessary to ensure the furnace working properly. Temperatures up to 1200° C. are quite easy; and when higher heats than this are required, great care has to be taken to ensure proper recuperation and adequate control of both the primary and secondary air. Of course, in any furnace the efficient regeneration or recuperation of the air is a means towards economy in fuel; but with the glass furnace, in addition to the necessity for all possible economy in fuel, it is of the greatest importance that the proper temperatures should be easily obtained with unfailing regularity—a condition which is fully provided for by the construction of the furnace.

The temperature necessary for properly "founding" and "fining" the metal is at least 1400° C.; and this was not obtained in our experimental furnace without considerable trouble. Our secondary air was only very imperfectly recuperated, so extremely accurate regulation of the primary and secondary air was necessary. In fact, it was not until the exhaust gases were tested for their CO_2 content that we were enabled to so regulate the furnace as to render possible temperatures above 1200° C. With the design of recuperator now arrived at, considerably higher temperatures may be looked for. Various temperatures can be obtained by shortening or lengthening the flame; and this can be brought about by the many different ways of mixing the gas and air.

It was thought possible that the tank could be worked out without the use of syphon pots. This, however, was found impracticable, as it upset the regulation of the primary and secondary air; and as the furnace works under a slight vacuum, the air drawn-in had too cooling an effect.

The exhaust gases are taken off at the opposite end of the furnace to the producer; and after passing down and outside the tank, they travel under it, and through the recuperator to the chimney stack.

The stack in use on the experimental furnace is 60 ft. high, and gives an ample "pull." Easy means of regulating the "pull" on the exhaust gases is very necessary, as this governs to no small extent the admission of both primary and secondary air. In any case, where natural draught is depended upon, the "pull" must, of course, be sufficient to overcome the friction caused during the passage of the air and the exhaust gases through the apparatus. If artificial draught should in any case be more convenient, an ordinary centrifugal fan is all that would be necessary.

As to the tank itself, this is constructed of quarls made of Stourbridge pot-clay; all the rest of the brickwork being built of ordinary common fire-brick manufactured locally.

The consumption of coke is at the rate of about 1 cwt. per hour; and the storage capacity of the producer is sufficient to last about four hours.

The bars require a little attention about once an hour; but this will naturally depend upon the amount of ash content of the coke. One of the conspicuous advantages of this construction of producer is that entirely unskilled men can be taught in a few hours to operate the plant; and its simplicity is so great as to obviate all those liabilities to getting out of order of which one hears so much in connection with many other types. The coke is used as received from the gas-works; but it is conducive to good working not to use the breeze formed in carting and handling the coke.

ALLOA CORPORATION GAS AND ELECTRICITY WORKS.

[Description prepared by Mr. J. W. Napier, the Engineer and Manager, for the Joint Visit of the Western and Eastern Districts of the Scottish Junior Gas Association, March 16.]

THE GAS UNDERTAKING.

The gas-works were acquired by the Town Council in 1877, at a purchase price of £23,250; the annual manufacture of gas being 26½ million cubic feet. The gas manufactured for the current year is estimated at 167 millions, with a capital debt of £40,800. The following statement shows the progress that has been made by the undertaking:

Year.	Capital.	Gas Made Cubic Feet Millions.	Capital.		Capital Charges (Interest and Sinking Funds) per 1000 C.Ft. Gas Made.
			Per Million C.Ft. of Gas Made.	Per 1000 C.Ft. of Gas Made.	
	£		£ s. d.	s. d.	d.
1880	26,026	25	1056 0 0	21 1	16·7
1912	30,891	140	220 7 0	4 4·8	5·38
1913	33,841	151	224 10 1	4 5·8	4·61
1914	46,696	155	300 10 7	6 1·2	4·99
1915	50,871	153	332 14 7	6 7·8	6·47
1916	48,042	150	319 15 9	6 4·7	8·23
1917	43,486	157	276 16 11	5 6·4	7·66
1918	40,800	167	244 6 2	4 10·6	6·03

The policy of the department has always been to keep down the capital debt, to preserve the works and plant in good condition, and to have efficient and up-to-date type of plant. A low capital account can be taken as a measure of the success of the management of a business. The debt on the Alloa Gas-Works has been reduced by payments to the sinking fund during each of the past two years, equal to a repayment of the total debt in 13½ years. This rapid payment will strengthen the concern in the years to come; and, despite the advance in the price of coal, extra cost of material, and a largely increased wages bill, the present gas rates —viz., 2s. 5d. per 1000 c.ft. to ordinary consumers, and 1s. 10d. to 2s. 4d. for power and industrial purposes—are likely to be continued. These rates include a war rate advance of 4d. per 1000 c.ft.

With a population of 17,400 within the area of supply, the quantity of gas sold per consumer is considerable. The annual consumption per consumer averages: Ordinary meters, 33,400 c.ft. automatic meters, 20,300 c.ft.; power and industrial, 317,000 c.ft. These results are largely due to the industrial character of the district of supply, to the comparatively low price of gas for many years past, and the facilities afforded to the consumers—free gas-cookers since 1905, &c.

The carbonizing plant up to 1905 consisted of horizontal retorts in settings of eights—all hand charged. The De-Brouwer retort-charging plant with electric motors (the first of this type of plant to be introduced into a gas-works in Scotland) was installed in 1905, and a telpher coke-handling plant in 1909, to deal with the hot coke direct from the retorts. With the system of vertical retorts rapidly becoming a practical proposition in gas-works' practice, it was deemed wise in 1910 not to proceed to a reconstruction of the horizontal bench to include retort discharging plant. At this time every available retort was in use during the winter months. In 1913, it was decided to erect a system of vertical retorts ("continuous-intermittent," Wilson system); and this has led to the complete scrapping of the old horizontal retorts and charging machinery, with an increased capital expenditure of £16,900 for new plant.

Statement Showing Comparison of Working Results of Horizontal Retorts with System of Vertical Retorts.

—	Year, 1913-14.	Year, 1914-15.	Year, 1915-16.	Year, 1916-17.
	Horizontal Retorts.	Vertical Retorts.	Vertical Retorts.	Vertical Retorts.
Gas manufactured, millions of c.ft.	155	153	150	157
Coal carbonized, tons	16,410	13,309	11,688	11,209
Price per ton	14s. 1d.	13s. 9½d.	20s. 6d.	20s. 8d.
Gas per ton, c.ft.	9,468	11,455	12,854	14,013
Wages	£1825,	£703	£717	£745
Wages per ton of coal carbonized	2s. 2d.	1s. 0½d.	1s. 2¾d.	1s. 4d.
Coke sold per ton of coal carbonized, cwt.	9·5	10 72	10·54	10·57
Tar made per ton of coal carbonized, gals.	9·10	15·14	16·38	16·38
Sulphate of ammonia per ton of coal carbonized, lbs.	21·50	25·88	25·95	29 80
Maximum number of stokers employed	24	6	6	7
Maximum number of retorts in use	88	12	12	12
Gas made per retort per diem, c.ft.	7,000	50,000	50,000	53,000

The use of steam in the working of the retorts has been practised for the past two years, but to a greater extent during last winter. The following table gives the economic results from steaming, showing a largely increased yield of gas per ton and an increased yield of ammonia. Compared with the horizontal retorts, the yield of sulphate of ammonia has been increased fully 60 p.ct. The results are the average for the month of November last:

Vertical Retorts, November, 1917, with Steaming.

Gas per ton, c.ft.	15,652
Calorific value, B.Th.U., gross	490/500
Tar, gallons per ton	15·57
Sulphate of ammonia, lbs. per ton	34·70
Coke saleable per ton of coal carbonized, cwt.	10 02
Gas made per retort per diem, c.ft.	64,100

A sufficient depth of hot coke at the proper temperature is maintained towards the bottom of the retorts; and this effects the easy decomposition of steam, with CO_2 from 2 to 3 p.ct. in the gas, giving an increased yield of ammonia, and a return of about 16,000 c.ft. of gas per ton.

As the result of almost four years' experience, the vertical retort has abundantly proved, in our circumstances at least, the great economies possible in the cost of producing gas, saving of coal, greater quantity of residuals, and less labour needed. Notwithstanding the large capital outlay (pre-war), which meant adding almost one-half more to the capital account, the financial results attained, and the present price of gas, testify to the success of the system. Gas-works that have vertical retorts already installed are undoubtedly strengthened for the future in a financial and practical way that will enable them to supply gas at a cheap rate. The system has in a high degree met the great difficulties of war-time conditions, particularly dear coal and labour.

ELECTRICITY WORKS.

The gas and electricity works occupy the same site. The affairs of both departments are directed by the same Committee, and are under the one management. The installation consists of gas-engines direct-coupled to dynamos, and producer gas plant of the suction type for use with gas-works coke. The engines can be run on coal gas if desired, which is used as a stand-by. The units of plant are:

80	H.P.	horizontal engine with	52	K.W. generator.
140	,,	,, ,,	95	,,
240	,,	,, ,,	162	,,
600	,,	vertical ,, ,,	410	,,
700	,,	,, ,, ,,	482	,,
1760	H.P.		1201	K.W.

The gas producer plant consists of seven sets of equivalent power to the engines installed. The experience of working the installation has been entirely satisfactory, and an additional vertical engine of 1000 H.P. is at present projected. The use of coke from the vertical retorts which is dry and well burned (being

practically free from volatile matter) has given excellent working conditions and results.

Combination of Working.

The combination of running the Corporation gas and electricity works presents a striking illustration of the possibilities of the conservation of fuel supply. With the largely increased horse-power units of engines, had it not been for the war, it was intended to erect Mond producers with recovery plant—the fuel to be used being coke and coke breeze, so far as the latter is available in amount; the gas to be used for the heating of the vertical retorts as well as for the purpose of driving the gas-engines. With this type of plant, the nitrogen value of the coke would be recovered, and a guarantee of 60 to 70 lbs. of sulphate of ammonia has been stated.

The sequence of working and the advantages of the gas-works and electricity works being interlinked in practice may be shortly summarized. Instead of raw coal being used in the boilers, which thereby would be consumed to destruction (which would be the case with steam generating plant), with the loss of valuable bye-products—tar, ammonia, &c.—it will be noted that the coal is first treated in vertical retorts, yielding a suitable gas for light, heat, and power to consumers who make use of gas as an agent for these purposes to meet domestic and industrial needs. The tar, with the valuable benzene and toluene, is recovered, as also ammonia, to be converted into sulphate of ammonia—of the utmost value to agriculture at the present time. The other residual produced—coke—is gasified in producers at the electricity station, equipped with vertical gas-engines; the result being that about 2000 tons of raw coal per annum are thereby being saved in electricity generation, and at the same time a convenient outlet is provided for the coke produced at the gas-works. Incidentally, the production of fuel practically on the site of the electricity station saves transport of material over the railway.

The claim is made that the co-relation of working interests between the gas and the electricity works provides for the treatment of coal on a scientific and highly economical basis; and our methods meet almost entirely the desired object of the Board of Trade Committee at present considering the problem of fuel economy. As bearing upon what has already been stated, and in proof of the undoubted economy resulting from the sequence of operations carried out in our gas and electricity works from the scientific treatment of raw coal to the transmission of electrical energy, a comparison shows that fuel costs per unit sold at Alloa are the lowest in comparison with a number of other towns.

Table Showing List of Towns with Quantity of Electricity Sold and Fuel Costs per Unit.

(Extracted from the "Electrical Times" Table of Costs.)

Town.	Output.	Fuel Costs.
	Number of Units Sold.	Per Unit Sold. Pence.
Alloa	1,001,452	0·28
Kilmarnock	5,026,800	0·29
Dundee	18,390,204	0·32
Glasgow	112,794,461	0·34
Motherwell	3,565,827	0·34
Greenock	21,149,458	0·35
Aberdeen	12,743,835	0·39
Edinburgh	17,373,558	0·48
Paisley	4,504,593	0·53
Kirkcaldy	2,314,391	0·56
Perth	1,288,836	0·62
Falkirk	1,309,458	0·65
Ayr	1,510,715	0·82
Stirling	510,459	0·83

Gas for Making Silk Substitutes.

As one of the offshoots of the many hundreds of operations in the great silk industry to which gas has been successfully applied, says Mr. S. E. Wardell, in the "American Gas Engineering Journal," it is extensively used in bringing upon the market silk substitutes. In connection with one factory where the common milkweed plant is made into ribbon and corded silk braid, gas is used first for heating the rollers between which the pulp is passed and flattened into ribbon strands. In place of flat-flame burners, a special burner was devised by Mr. Edgar Atherton, of the Public Service Gas Company of New Jersey. This is of small size, to fit inside the revolving roller. Some ¼ in. pipe was used, 8 in. long. Air and gas are supplied in the ratio of 8 to 1; the former at about 1 lb. pressure. About twenty-five of these gas-burners now give satisfaction, with practically no spoiling of the goods. After the strands have been dyed, they are dried by other gas-heated rollers; and flowering and embossing are finished in the same way. In regard to the braiding machines, a like difficulty arose in supplying burners, due to the very small size and sensitiveness necessary, on account of the small bore of the roller; but after some experimenting, the proper result was attained.

Midland Association of Gas Engineers and Managers.—The annual meeting will be held on Thursday, April 11, at the Grand Hotel, Birmingham. The programme of business is not so far completed, but will be announced later on. Mr. W. Chaney, of the Saltley Gas-Works, of Birmingham, is the new President.

COKE-OVEN MANAGERS' ASSOCIATION.

WESTERN SECTION.

Visit to the National Gas-Engine Company's Works.

On Saturday, members of the Western Section of the Coke-Oven Managers' Association paid a visit to the works of the National Gas-Engine Company, at Ashton-under-Lyne. They were welcomed at Guidebridge Station by the General Manager (Lieut. E. Bamford) and several of his staff, including Mr. T. Mohn, M.Inst.Mech.E. (Designer and Chief Engineer), Messrs. W. Wood, M.Inst.Mech.E., and W. Oakden (Works Managers), and Messrs. Hallsworth and Wild represented the commercial staff. Luncheon had been provided at Guidebridge; and special tram cars were available to take the party to the works. Among those present were Mr. S. Stonier (Chairman of the Section), Mr. D. V. Hollingworth (Hon. Secretary), and several members of the Midland Section.

Arriving at the works, the first object to claim attention in the large engine-shops was a 1500 H.P. engine coupled direct to blowers for blast-furnace work. This was one of a group of seven being erected for a steel and iron works. The engine itself was completed, and under test; and it was started-up, and the working explained. The ease with which the engine was started, and its almost noiseless running, were remarked by the visitors. It was an education of particular value to see these engines in various stages of completion, from the rough castings to the finished article. All the operations in this modern and well-equipped machine shop were examined with the greatest interest. The machinery in this department is run by a 750 H.P. gas-engine of the firm's own manufacture, supplied with producer gas from a Mond plant, consisting of two 10 ft. diameter producers of the ammonia-recovery type, consuming some 100 tons of coal per week. A piece of apparatus which immediately caught the visitor's eye was a recording pyrometer. This instrument automatically and continuously records the temperature of the hardening and annealing furnaces, and thus ensures both the proper time and temperature being employed. The Company are, of course, largely engaged in the manufacture of munitions, and employ a great number of women. Some excellent examples of their work were on view—notably the steel linings of aeroplane engine cylinders, which had been made throughout by women.

A large part of the works next inspected was given over to the production of traction engines, of all sizes; and many were specially run for the benefit of the visitors. It was a matter of interest to be informed that the first tractor engine ever made was put together in these shops. The party were then taken to the foundry, where they had described to them the means adopted for making the various classes of cast iron required for different parts of the engines. A feature of the "National" engine is the removable cast-iron liner now being fitted. This, being only some seven-eighths or three-quarters of an inch thick, has, of course, to be made of the very best quality cast iron.

At the termination of what was generally conceded to have been one of the most interesting visits made by the section, the members were entertained at tea in the Board-room attached to the works.

Mr. Stonier then took the opportunity of thanking the Directors, the General Manager, and his staff, for the opportunity of so excellent a visit. He said he could not help remarking on the great care taken in the selection of the materials used in the construction of the engines, and on the excellent workmanship which was put into them.

Mr. D. V. Hollingworth said he was sure it would be the desire of all present to thank Mr Bamford and his principal officials not only for the privileges of the visit, but for the great trouble they had taken in describing and explaining the various engines and plant inspected. He congratulated the Company on the state of perfection they had now attained in gas-engine construction. What he had that day seen in the way of works organization, up-to-date plant, and good fellowship among the staff, entirely confirmed him in the opinion that the Company had a great future before it. He proposed a hearty vote of thanks to the Company.

Mr. Finn, in seconding, said it had now been generally agreed that there was no better way of using the energy of coal than by carbonizing it in the vicinity of the colliery and using the spare gas in engines. For coke-oven managers, the study of gas-engines was of the greatest importance, as he believed they would play an important part in the production of power in the future. The days when it would pay to use spare gas under boilers were over.

Lieutenant Bamford, in reply, expressed his satisfaction that it had been possible to have the members of the Association to visit them. There was no doubt, he said, that the large gas-engine had come to stay. He was proud to record the enormous expansion of their business, which was particularly gratifying after the strenuous times they had had in the past, when the gas-engine business had to be wrested from the foreigner.

Informal Meeting of Scottish Gas Managers.—The thirty-fifth annual informal meeting of Scottish Gas Managers will be held in the hall of the Royal Philosophical Society of Glasgow, Bath Street, on Wednesday of next week (April 3), at 2 o'clock, when the President (Mr. Robert Cowie, of Dalkeith) will deliver an address. In sending out the notice, the Convener (Mr. J. W. Napier, of Alloa) adds that a large attendance is desired, in view of the several matters of importance at present affecting the interests of the gas industry.

COKE-OVEN MANAGERS' ASSOCIATION.

MIDLAND SECTION.

Lecture by Prof. W. Fearnsides.

A Meeting of the Midland Section of the Coke-Oven Managers' Association was held on Saturday last, at the Hall of Applied Science, Sheffield University—Mr. J. W. LEE (the President) in the Chair.

The PRESIDENT said he did not need to introduce to the members the lecturer of the afternoon, Prof. W. Fearnsides, who was one who was always ready to help the Association, and who was engaged in work which was the very foundation of their industry.

Prof. FEARNSIDES, by the aid of a blackboard, gave an address on

THE TEXTURE OF COKE-OVEN BRICKS.

In opening his subject, the Professor said he would like to declare at once that neither he nor anybody else in this country really knew much about the inwardness of the texture of coke-oven bricks. His remarks, therefore, would be quite tentative; and he would be glad if any member could pull him up and correct him on any point. He would not be at all surprised if, on some occasion when he might address the Association in the future, a good deal of what he said might have to be modified or even negatived. About a year ago he had addressed the Association, dealing with the two main constituents, from the point of view of the mineralogist, which went to make up the raw material from which coke-oven bricks were manufactured. These were sand (the mineral quartz) and clay. All coke-oven bricks were made from mixtures containing a large proportion of these two original minerals. Briefly recapitulating his observations on the former occasion, the lecturer said that quartz was a mineral found everywhere, and representing the survival of the part which was least soluble in granite. Quartz, the mineral, could be obtained, by the millions of tons together, in great pieces which had purity up to 98 p.ct. It had a specific gravity of 2·65. It expanded with a rise of temperature, though not so rapidly as many other minerals, until it got to a temperature of 575° C., when, quite suddenly, it changed from the alpha variety into beta. Modern work done lately, particularly by the French, seemed to show that what it actually did was to go down a little bit at a greater heat still. How far it went down he (Prof. Fearnsides) did not know; but it seemed to take a turn-up and increase in volume. According to the Americans, at 870° it had a chance to go over into another mineral volume.

Since he had addressed the members last year, a very great alteration had come over opinion in regard to the change from quartz into tridymite. At 1470° C., it was becoming interesting to the steel men and also to the coke-oven men; and when it got over this, it expanded again quickly and passed into the mineral crystobalite. They had to consider, in dealing with the texture of the bricks, the fact that they had with them a mineral which, in five minutes, could come up from the beta to the alpha variety, or *vice versâ*. If they had a silica brick doing this in ordinary works, it might look quite clean at one time and immediately afterwards be absolutely covered with dust, owing to electrical disturbances. Every time they had a coke-oven wall with some silica past 575°, they had danger of this change; and arrangements had to be made for this quickly reversible change when passing 575°. Every time they had the oven off or had the ram in, he thought coke-oven walls must pass this temperature to a depth into the walls of at least an inch. This statement might be open to correction, and he would be glad of it if this were so. Beta quartz, by itself, did not go over to tridymite at 870°. It was a matter of great importance to users of coke-oven walls to have it under their control where they had a matrix which caused the solution round which the other material crystalized. Quartz was very slow to go into tridymite, and tridymite was slow to go into quartz. Quartz heated suddenly at 1500° C., against which some liquid steel ran, went right up and suddenly had ceased to be quartz, and became crystobalite. If the steel be at 1600° or 1650°, then it meant that it went straight away to vitrified silica. If they had grains of quartz in a matrix, they would expand and squeeze on to their neighbours at 575°. If under suitable conditions, above 870°, they would make another change, and squeeze their neighbours tighter. The users must see to it that the material was kept tight, so that any gases from the coke-oven could escape between the particles; but one liked to see, at the same time, that when the grains were keeping their neighbours just pressed, they were not trying to make the wall a bit longer or higher. One wanted the materials to keep tight, but not the whole bulk of the material to expand.

Kaolin was something about which much less was known. It was a mineral which could be obtained under certain circumstances in association with certain sorts of rotted granite—granite which had lost all its nature by reason of the action of vapours which had come up from below. He did not know anything about the actual volume changes which affected kaolin as a mineral. Kaolin always occurred in particles which were too small to be individualized, even in a high-power microscope. They could not use specific gravities or make those nice experiments which they could with quartz, and could only guess. They had very interesting guesses and leading experiments as to how they should guess. Kaolin rose in temperature exceedingly slowly, and stopped just past 100°, when the water went off. When the water had gone off, it rose; but when it got to about 600° it absorbed a lot more heat—the quantity of which was not certain—and then, when it had had its change, went over again. At about 950°, it had something like a spurt in getting hotter, and just about 1000° it went up, and then came down again. This meant some change at the various stages named. The reason why they had silica mixed with kaolin was in order that the one could grip with the other. The question as to whether they should have their clay in large or quite small pieces, and the same with the quartz, was one on which he would like coke-oven managers to help him to develop a point of view. If they were dealing with absolutely pure materials (kaolin and quartz), it appeared from experimental evidence that quartz could live quite happily in contact with kaolin at temperatures far higher than any temperature required in coke-ovens—up to well over 1300° or 1400°, and possibly up to 1500°—and no reaction took place. It was known that at temperatures about 1400° there was a penetration of the one into the other; but they did not know by experiment lower down. They were clear on the fact that the ideal material was a pure one. But they were not so clear that it was a commercial proposition to employ pure kaolin and pure quartz, which, together, comprised porcelain. He was not at all sure that they would have something they could work with if they got best Berlin porcelain. At any rate, they could not afford to use best porcelain in coke-oven walls. So they used the next best material—fire-clay.

Fire-clay always contained some small quantity of lime, magnesia, iron, &c. This material would be close to the place where the quartz was expanding—where the kaolin was coming away from it. Neither felspar nor mica in coke-oven walls ever got to the melting point by itself; but there was something—generally spoken of as solid solution—the effect of which was that in two materials of high melting point put in the form of a solid, each caused its neighbour to react and make a low melting point mixture. He did not know at what temperature this began; but it appeared to begin just above 900° C. It was known that if there were alkalis present they might expect the tridymite expansion would take place quickly, and probably often—each time they had the heat; and alkalis in the silica was a matter of very grave importance. There was some evidence that iron acted in a similar way. Iron, of course, was present in one of two forms—the ferrous or the ferric. The latter, so far as was known, was inert. He doubted very much whether in a coke-oven, when gases were being delivered from the charge, it was possible for a ferric salt to remain; and therefore they were not concerned with this inert material. But they were concerned with the ferrous material, which was by no means inert, and which acted as did alkali and formed a convenient help to the silica to do the growing which it might otherwise not do. Lime and magnesia acted in a similar way.

All this meant that whatever impurity they had in the fire-clay was an impurity which was likely to set going changes which were known about, and which might otherwise be delayed to much higher temperatures. The impurities in most cases were not in the silica—they could get silica pure. The impurities were generally present in the fire-clay which was used. If they employed large pieces of silica—and this was where texture came in—the parts of the piece which were in contact with the fire-clay round about were a small portion of the whole. If the silica was fine and the texture evenly ground, it was clear that the proportion was very much less. Therefore the large pieces were much more likely to survive a long course of treatment with the impurities present than if a very fine silica were used. At the same time, he was not prepared to recommend one or the other. It was a matter for each manager, knowing his own practice and plant, to decide whether the difficulties which came from a coarse-ground material were greater than the certain gradual attack on the small pieces which they might also have. It appeared that if they had a very pure fire-clay which was almost a kaolin, and a very pure silica, the finer they ground the materialt he more chance they had of getting uniformity when the whole mass was heated. If, on the other hand, they had a matrix which was chemically active with respect to the silica, then it was pretty clear that they should go to the large piece.

He wanted information from practical managers and help in discovering the direction in which they ought to investigate this matter. It was a question which would have to be watched. Texture was a matter that was, and must be, controlled by the composition of the materials they mixed; but texture must also be controlled by the conditions under which they wished to work the materials at hand. One of the most important things in coke-oven construction, it seemed to him, was that it should be gastight. If they could not have a material absolutely gastight, they should have the pores in the material as fine and as devious as possible, so that the positive pressure would have a lot of friction to overcome in order to leak through the substance of the material. It seemed, then, that (other things being equal) the more nearly they got to complete compactness, the better they would be able to hold their gas. But when they got near to this, another factor came into consideration. He suggested that the place where the shattering took place, and the pieces came away an inch or so thick, was where the quartz was passing from alpha to beta, at 575°. Tridymite did not change at this temperature; but it had a change at a lower temperature. So that, so far as

this matter was concerned, if they could get a brick in which the fire-clay, by reacting, had converted all the silica present in the mass into tridymite, then they should be without that particular trouble at that temperature. It was within his own experience that there were certain bricks which had the particular composition of 83 p.ct. silica of which he had spoken. He knew that some had been used and were free from this trouble, and that they contained, after many fires, quite an appreciable quantity of tridymite. He did not say this was cause and effect; but he thought it was a fact which had some bearing upon the matter. In the sister industry of the making of town gas there were various sorts of retorts, and almost the same set of experiences had been gone through as those which the coke-oven industry was going through with the same materials now. Quite a lot of silica retorts had been used. When these were first put in, they showed a gas leakage which was wasteful in the extreme, and would not be tolerated for long. But after a time, if their settings, &c., were right, they coated themselves over on the inside with a certain carbon—filling up their pores and making themselves much more compact. He wondered if in the future in this country—indeed, if in the present in America and Germany—they had a means of choking the oven walls with carbon to have this effect. He fancied they had something of the kind; and he considered it was an important matter. He would like to know whether any member had noted any particular difference of behaviour between bricks which had a moulded face-up against the wall and pieces of brick which had been dressed and in which the dressed face was seeing service. There was a very serious difference. It was, in part, a difference of texture. In the ordinary way the moulded face was attacked by salt, &c., at a rate not one-fifth of that at which the rough broken surface was attacked. This was a matter in which texture of the clay, not of the large pieces but of the small ones, mattered very considerably. Texture was important when they were considering pieces the size of a thumb nail. It was still important in pieces which were smaller than the ordinary person would see with a high-power microscope—in fact, it was important right down to the minutest particles.

DISCUSSION.

The PRESIDENT said Prof. Fearnsides had given them an address of such depth and value that he could not hold out much hope of the lecturer's invitation to criticize and correct being accepted. In his (the President's) judgment, he was certain that the consideration of the texture of a brick was more important than most of them had been in the habit of thinking, and certainly as important as the chemical composition of a brick. Some of them—particularly in the gas industry—had been analyzing bricks, thinking they might draw up a chemical specification. Especially was this done some years ago. They had forgotten that it was impossible to draw up a chemical composition and expect that with this they were going to get a brick which was suitable for all changes of temperature. They used to say the brick going into the combustion chamber should have a certain composition. In all this matter one had to frankly admit that, for a number of years, anyhow, they had been forgetting texture. Some few of the prophets had suggested that texture was an important matter; but he feared they had not been listened to with proper patience. To-day they sat at the feet of Prof. Fearnsides, and were all ready to admit the assertion that texture was as important as chemical composition of the brick. Probably all that they could do was to express to the lecturer their gratitude for the information he had given, and the closely reasoned method of argument which enabled them all, whether chemists or not, to follow him.

Mr. HUGHES moved a vote of thanks to Prof. Fearnsides.

Mr. OXLEY, in seconding, said they could feel assured that the question of fire-bricks, in the hands of Prof. Fearnsides, was in good hands so far as affected the betterment of coke-oven managers and in the effort to produce a brick which would be compact enough to withstand the pressure of gas and also resist the action of salts.

The PRESIDENT, in putting the resolution to the vote, remarked that some of them, that afternoon, had doubtless been thinking of the many changes of temperature which took place on their plants in the ordinary working day. They would all try to avoid certain chillings which had commonly taken place, and reduce it to an absolute minimum, and so get uniform heating. If they put into practice nothing more as a result of the address, they would have gained something worth while. If at any time they could assist Prof. Fearnsides with their plants or otherwise, he was sure they would all be pleased.

Prof. FEARNSIDES, in reply, said he would like to express thanks for the very excellent support which had been given to the Department by the South Yorkshire coal owners, in the form of a grant of £1000 just before Christmas. The interests of coke-oven managers were not likely to be overlooked in the experiments and investigations conducted there. He would have been very grateful for some little criticism; and if it should occur to any member later to write him on any point he would be exceedingly pleased, because he was largely groping in the dark. He occasionally visited coke-oven plants; but, of course, he was not conversant with the thousand-and-one problems which cropped up on the plants. The President's suggestion as to keeping a uniform temperature was a good one, and very practical. The coke-oven manager did not need a brick highly refractory in the ordinary sense—he wanted a brick which would stand change of temperature. Hitherto the tests had seemed to be concentrated on high temperatures; but he thought the bulk of the mischief in the coke-oven walls was in the changing of temperature. He had purposely said nothing about salts; but he would remark that salt readily added itself to fire-clay, and this was one of the reasons why it was so troublesome. There was another matter which would have to be gone into very carefully. When reaction took place between quartz and fire-clay, inside the fire-clay which had been partly burned, some gas was given off; and it was the evolution of gas which was responsible for the things they saw, and which brought away pieces from the side of the walls. He did not know what the gas was; but he was certain that it was the gas which caused the trouble. If by making the coke-oven bricks so fitted on the outside film that they could prevent the evolution of the gas, they would have gone a long way towards remedying the trouble.

The meeting then adjourned.

The next meeting of the Association is to be on April 27, at Leeds, when a paper is to be read by Mr. Hamer.

Low-Pressure Hot-Water Systems.

Information of a practical character on the subject of the low-pressure systems of hot-water plants in general use for heating buildings, and the principles on which these systems are based, was afforded by Mr. Alex. Kay, in a paper which he read before the Glasgow Corporation Foremen's Association. He described first the overhead or drop method, and then the two-pipe and the one-pipe systems. The need was emphasized of carefully studying the special requirements of each installation, and of seeing that the requisite amount of heating surface is provided to give the desired temperature. In order to ascertain the number of square feet of radiation or heating surface required to heat a building or room, together with some of the enclosing walls that are exposed to the atmosphere, it is necessary to know the cooling effect of these surfaces. The loss of heat in this way, and the amount requisite to warm the incoming air, can be definitely ascertained by the use of known formulæ. Then there has to be considered the boiler; and this must not be too small for the work it has to perform. One case was quoted in which the results obtained were not satisfactory. The piping was properly arranged, with no defect to prevent free circulation; and the radiating surface was sufficient, though not excessive. But inspection revealed the fact that the gas supply to the boilers was inadequate; and the remedy was the provision of a larger pipe from the meter.

Brass Melting by Gas.

Writing in the "American Gas Engineering Journal," Mr. Charles C. Krausse, of the Consolidated Gas, Electric Light, and Power Company of Baltimore, points to numerous advantages gained by the use of gas, in place of coke, for brass melting. A description is given of a coke-fired furnace converted to gas fuel, with burners of the blast type; the air being supplied by a Roots blower, giving 1 lb. pressure at the furnace, with a gas pressure of 2½ in. There are two special burners; the maximum consumption of both being 500 c.ft. per hour. The injector burner ratio is 1 : 4·27. The amount of gas to be burned in the furnace per hour was determined by two very important factors—the amount necessary to secure the required number of heats per day, and the effect of this increased consumption upon the consumers' demand. The author says the amount of gas required to melt 100 lbs. of brass has such a wide variation that it is almost impossible to safely quote any definite figure, unless extensive tests have been made over a long period. It depends upon the amount of metal melted at a time, the number of heats per day, the composition of the metal, the pouring temperature desired, and the efficiency of the furnace tender. However, he gives the following figures (from his experiments) as perfectly safe to use for crucible furnaces where a foundry runs from three to four heats per day, of 125 to 150 lbs. each, with a reasonable amount of care in operating: Red brass, 5·34 c.ft. per pound; yellow brass, 5·2 c.ft.; monitor metal (red brass, very high temperature), 7 c.ft.; 10 p.ct. tin, 2 p.ct. zinc, and 88 p.ct. copper, 5·51 c.ft., and phosphor bronze, 5·37 c.ft. The figures give an average of 5·68 c.ft. of gas per pound of metal, melted over a period of about five weeks, with the furnace operated by the ordinary coke-furnace tender. Actual tests revealed an average increase in life of five heats per crucible with the gas-furnace, as compared with coke; while a table with which Mr. Krausse concludes shows the cost of crucible and fuel per 100 lbs. of metal melted to be $0·524 with gas, and $0·778 with coke. This is reckoning coke at $12 per ton, and gas at $0·5 per 1000 c.ft. The calculation takes no account of the possible saving in shrinkage, labour saving, storage and handling of coke and ashes, and increased output, which are all in favour of gas fuel.

Thawing Gas-Mains by Electricity.—In a letter to the New York "Gas Age," Mr. Harry Wentworth states that the thawing of gas-mains by an electric current is common practice in Canada. Mains up to 6 in. diameter have been successfully treated for considerable stretches in this manner; the test being particularly severe in cases where a burst water-main has caused a break in an adjacent gas-main, flooded it, and the gas-main has then frozen solid. Electric connections can be made to drip-risers or house-services, or the main can be exposed at each end of the affected portion and connections made to it direct. This method is equally satisfactory for cast and wrought iron mains, provided, in the former case, that cement joints are not in use; and there would not seem to be any reason why larger mains could not be so thawed, if necessity arose. The time taken will vary according to the length and diameter of the pipe affected; and as frequently the surrounding earth is frozen solid, it is a wise precaution to blow-out a service as soon as it is thawed, and in the case of a main to pump any drips likely to be affected.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Light and Coke Company's Co-Partnership Scheme.

SIR,—If, as seems to be the case, the bonus payable to co-partners under the Gas Light and Coke Company's new scheme is reduced to 2s. p.ct. for every penny reduction in the price of gas, as compared with 15s. or 20s. under the old scheme, such reduction greatly stultifies one of the principal objects of co-partnership, which is to offer substantial inducement to employees to make their employers' interest their own.

The present position is admittedly a difficult one; but emasculating co-partnership, which is really what the scheme amounts to, is surely not the right way to deal with it.

CHARLES HUNT.

17, *Victoria Street, S.W., March* 20, 1918.

The Reading Gas Company and the Aldershot Gas Bill.

SIR,—Referring to Mr. Edwards's letter in your issue of the 19th inst., and to the publication (which he has thought advisable) of the letters which passed between us, I would say I do not think the subject is of sufficient interest to your readers to warrant my going into details. Mr. Edwards, however, writes "that the statement by my Chairman is scarcely reasonable, and not justified . . . and that its spirit is not that which one would anticipate from a neighbour to whom every consideration has been given."

If any of your readers are sufficiently interested in the matter, I would ask them to refer to an Ordnance Map showing where our respective works are situate, and the intervening districts (parishes) in dispute, as such reference would, I am sure, convince anyone that my Chairman's remarks are most reasonable and altogether justified; and that it is not we who have been unneighbourly.

The parishes in dispute are not only on the confines of our statutory area, but are also very much nearer to our works than to Aldershot; and we are at present supplying one of them.

I am loth to trespass further on your space, but must add that we were not the only gas company to resent the action of the Aldershot Gas Company in seeking powers—particularly in such times as these—to supply gas so far away from their centre of manufacture, and so close to the territory of other undertakings.

D. H. HELPS, Engineer and Manager.

Reading, March 20, 1918.

REGISTER OF PATENTS.

Helical Metal Tubes or Pipe Lines.—No. 112,659.

MURPHY, S. J., of Drogheda.

No. 864; Jan. 17, 1917.

Briefly describing one form of his invention, the patentee says: An ordinary helical interlocking tube of (say) 3 in. internal diameter, is supplied with any desired form of packing. Outside of the tube are wound spirally two layers of flat steel ribbon—first one layer, and then the other one upon the first. The ribbon may be of No. 20 gauge and ¾ in. wide. Instead of composing each layer of a single ribbon, he proposes that each shall consist of twenty lengths of ribbon arranged side by side. The ends of the twenty lengths are fastened in the first instance to the flange at one extremity of the inside pipe (equidistantly around the circumference), and are then wound spirally, side by side—the edges being in contact with each other. A very steep spiral is thus formed, which nevertheless completely covers the internal tube. The same process is carried out in respect of the outermost layer, which is likewise made up of twenty lengths of ribbons. Thus, by using twenty lengths of ribbon each ¾ in. wide, there are 5 in. of piping for every lap; and yet in appearance, and also in flexibility, each layer would be practically the same as if it consisted of one single ribbon instead of the twenty. The layers are arranged to cross right and left-handedly.

Such a pipe-line will not yield lengthwise up to the limit of the tensile strength of the steel ribbon which forms its respective layers, because the ribbon would never at any time be stretched into a straight line. The tensile stress tends to compress the circumference of the folded tube; and, incidentally, this increases its power to resist internal pressure.

Apparatus for Storing and Utilizing Energy. No. 113,137.

ANDERSON, D., of Putney Hill, and SCOTT-SNELL, C., of Wimbledon.

No. 1906; Feb. 7, 1917.

This invention relates to apparatus for utilizing the pressure of the atmosphere as a motive power, comprising a cylinder in which works a piston adapted to be raised or withdrawn by manual or other power from the bottom or inner end to the top or outer end of the cylinder, in order to produce a vacuum within the cylinder (below or at the inner side), which is afterwards forced into it again by the pressure of the exterior atmosphere—the downward or inward movement of the piston being utilized to communicate power through gearing suitable for the operation of a vacuum motor.

The annular space between the cylinder and the piston is closed in air-tight by a ring or sleeve of flexible impervious material that will permit the piston to be freely drawn outwards and pressed inwards. The inner end portion of the cylinder fits the inner end portion of the piston; so that practically no space or clearance will exist between them when the piston is in its innermost position.

Combined with the cylinder and piston are means whereby the piston can be drawn outwards from the cylinder into an operative position; means by which the piston can be held in this position until it is desired to allow it to return towards its inoperative position; and power transmitting means designed to be operated by the return motion of the piston under the pressure of the atmosphere for transmitting the stored energy to the device to be operated—such power transmission means being adapted to be brought into action, at will, by a clutch or like coupling device.

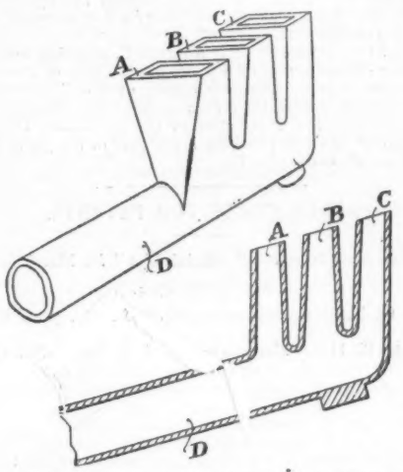
Thus, the piston may be withdrawn and energy stored, by the aid of a wire, or other flexible connector wound on a wheel or pulley fixed to a shaft adapted to be rotated by manual or other power and mounted in bearings carried by, or rigidly connected to, the cylinder. Or the piston may be withdrawn by ratchet and pawl mechanism worked by a hand lever or by screw mechanism, worm gearing, or lever mechanism.

Gas-Burners for Furnaces.—No. 113,239.

FLETCHER, RUSSELL, & CO., LTD., FLETCHER, T. W., and SINGLETON, J. H., of Warrington.

No. 13,583; Sept. 21, 1917.

This invention has reference to burners having approximately fan-shaped nozzles substantially at right angles to the mixture tube. When such a burner is insufficient to give the required heat, it is at times a matter of difficulty to fit two or more burners "owing to the lateral dimensions of the nozzles;" and the invention has for its object to overcome this disadvantage—the burner being provided with two or more nozzles spaced close together along the mixture tube, arranged in line or staggered laterally relatively to each other.



Fletcher, Russell, & Co.'s Gas-Furnace Burner.

The burner illustrated is provided with three approximately fan-shaped nozzles A, B, C, spaced close together along the mixture tube D, and in line with each other. The nozzles may, however, be rather more widely spaced to distribute the heat over a greater area; and instead of being in line, they may be given a slight relative lateral staggering to opposite sides.

The patentees state that they are aware that burners for incandescent gas lighting have been provided with a plurality of nozzles splayed or approximately fan-shaped and grouped close together, and that the nozzle of an atmospheric gas-burner has been provided with a plurality of slot-like apertures arranged close together, and the sides of which diverge laterally; they are also aware that a gas heating burner has already been provided with a plurality of nozzles arranged at right angles to the mixture tube.

Producing Combustible Fuel.—No. 113,585.

ROSE, J. R., of Edgeworth, Pennsylvania, U.S.A.

No. 16,126; Feb. 28, 1917.

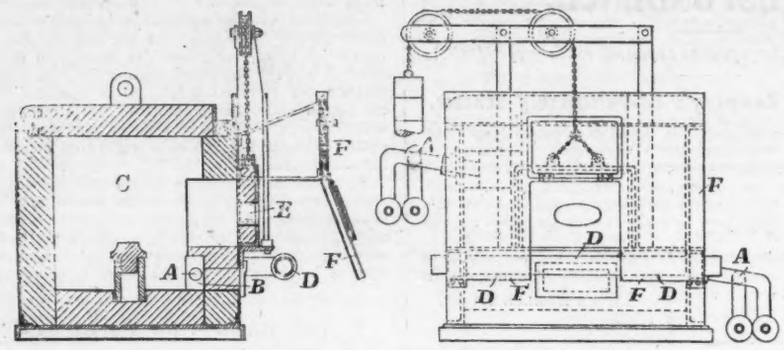
This invention relates to an apparatus for manufacturing gaseous fuel adapted for use in the cutting and welding art. It is the general object of the invention to provide a generator wherein such a fuel can be produced without the employment of supplemental generators. A further and more limited object of the invention is to produce a generator having an arrangement of flues whereby a hydrocarbon fluid may be dissociated and the products mingled with another hydrocarbon fluid which is also dissociated; the products of such dissociation being re-combined to produce a new gas particularly useful in such cutting and welding art as is described in patent No. 113,657.

Metal Heating Furnaces.—No. 113,594.

RICHMOND GAS STOVE AND METER COMPANY, LTD., of Warrington, and THOMPSON, J., of Sheffield.

No. 276 (of 1918); May 14, 1917.

The furnace shown is of a type used in connection with the heating of articles within it (such as steel cutters and other metal articles) by gas, the flame of which is forced into it, under *plus* pressure, by



Thompson's (Richmond Stove Company) Metal Heating Furnaces.

burners. The body of the furnace is mainly made of fire-resisting material enclosed within a metal casing carried on a bed. The aperture or mouth through which articles are introduced is in the front wall; and a vertically sliding door works over the mouth and is counterbalanced by a weight connected to it by a chain working over pulleys.

There are two pressure heating burners A, and induction ports B adapted to direct the flames tangentially into the furnace chamber C over the surface of the wall at the upper and lower part. A pipe D for delivering air in a stream in front of the furnace door is provided with a row of holes in its upper surface, so that a vertical curtain of air is forced upwards from the pipe in front of the doorway. Thus all the escaping gases which are discharged through the opening E in the door are diverted from their normal horizontal or outward direction of flow, and driven upwards.

In front of the furnace front is a guard F, standing away from the furnace some distance, and in a plane outside that of the tube D. It has in its front opposite the door a gap, over or in connection with which a transparent movable screen is employed, through which the operator can see. The lower part of the guard and the screen are inclined slightly outwards; and the lower part of the guard is extended downwards to below the pipe D.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for March 20.]

Nos. 4198—4704.

Beilby, G. T.—"Carbonization of coal, shale, peat, wood, &c." No. 4287.

Bicknell, R. H.—"Manufacturing pipes, &c." No. 4435.

Blyth, M. W.—"Purifying benzol, &c." No. 4237.

Brooke, R. M.—"Horizontal and inclined retort settings." No. 4504.

Davis, J. E.—"Gas-burners." No. 4340.

Davis, J. E.—"Gas heating-stoves." No. 4341.

Dempster & Sons, R.—"Heating horizontal retorts for gas production." No. 4203.

Dempster & Sons, R.—See Brooke. No. 4504.

Dobson, D. R.—"Gas-producers." No. 4588.

Dobson, D. R.—"Combustible gases." No. 4589.

Easton, R. W.—"Retorts, coke-ovens, &c." No. 4525.

MacGregor, J.—"Fittings for gas-burners." No. 4210.

Maxon, H. R.—"Combustion of gas." No. 4543.

Miles, T. V.—See Blyth. No. 4237.

Mitchell, J. B.—"Gas-containers for motor vehicles." No. 4701.

Pickard, W.—See Dobson. Nos. 4588, 4589.

Saunders, C. W.—"Utilization of heat of gaseous fluids." Nos. 4261, 4262.

Sims, A. G.—"Cutting, crushing, &c., coke, coal, &c." No. 4266.

Spicer, H. H. (*Wells*).—"Production and treatment of gas." No. 4673.

Toogood, H. J.—See Dempster. No. 4203.

Wells, J.—See Spicer. No. 4673.

Weyman, J. E.—"Atmospheric burners." No. 4416.

Irish Gas Prices.—Clonmel gas prices are to be increased from 5s. 3d. to 5s. 9d. per 1000 c.ft. for lighting, and from 4s. 5d. to 5s. for engines and cookers. These increases, it is stated, will barely meet the expenses of the coming year. The Company calculate that the output of gas has increased about 12 p.ct., largely owing to the demand for cookers; but the increased expenses constitute a serious element. The Lisburn Urban Council decided to increase the price of gas from 5s. to 5s. 6d. per 1000 c.ft., which is only 6d. below the maximum provided for in the Provisional Order. At Ennis (co. Clare), gas is now sold at 10s. per 1000 c.ft.

Burnley Gas-Works' Finances.—In presenting the annual rate return at the Burnley Town Council, the Chairman of the Finance Committee stated that the Corporation Gas Department's estimates for the year just closing showed a deficiency of £3650; but the revised return revealed a surplus of £1530. The Finance Committee considered, having regard to the exigencies of the present time, it was not desirable to apply this balance to the relief of rates, and had, therefore, recommended that it should be carried forward to meet any unforeseen circumstances that were not provided for in the estimates. The Chairman of the Gas Committee announced that he had received another application for an increase of wages from the men, who want an advance of 1s. 8d. per day or shift, or a minimum war advance of 3s. 6d. per day or shift, *plus* 12½ p.ct.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The Brixham Gas Bill was reported, with amendments; to await third reading.

The Pontypool Gas and Water Bill, the Wandsworth, Wimbledon, and Epsom District Gas Bill, and the Aldershot Gas, Water, and District Lighting Bill are to be considered by the following Select Committee, to meet on Wednesday, April 17: Lord Forteviot (Chairman), Earl of Doncaster (or the Duke of Buccleuch and Queensberry), Earl Eldon, Viscount Falmouth, and Lord Leigh.

The Committee already announced, who will consider the British Gas Light Company (Norwich) Bill and the Chepstow Gas Bill, will meet on Wednesday, April 10.

HOUSE OF COMMONS.

Sir James Yoxall has given notice, on the second reading of the Brentford Gas Bill, to move—"That it be read a second time upon this day six months."

Mr. Scanlan and Mr. Brady have given notice, on the second reading of the Alliance and Dublin Gas Bill, to move—"That it be read a second time upon this day six months."

Earlier Closing Order.

Mr. Wright asked the Home Secretary whether it was the intention of the Government to include the House of Commons among the places to be affected by the proposed Order in Council imposing early closing during the spring and summer months; and if such inclusion would effect a considerable conservation of the elements of energy, heat, and light.

Sir Albert Stanley (the President of the Board of Trade), who replied to the question, said the Order which the Board of Trade were about to issue would not apply to the House of Commons. He hoped, however, that not only the Houses of Parliament, but all public departments, would consider themselves under the same obligation to reduce their consumption of gas and electricity as if the Order specifically applied.

Lighting, &c., Restrictions.

Mr. Kennedy Jones asked the President of the Board of Trade whether he was in a position to make any statement concerning the alleged intention to close theatres, music-halls, cinema theatres, restaurants, and other places of public resort in London and the Home counties at 9.30 p.m. as from April 1.

Sir A. Stanley, in reply, referred to the statement he made to the House the previous night.

Employment of Lascars in Gas-Works.

Colonel Thorne asked the President of the Board of Trade if he was aware that a number of Lascars were being employed under the South Metropolitan Gas Company at their Greenwich works; if he was aware that this was causing discontent among the workmen; if he could give any reasons why Lascars were engaged on such work; and if he would take action in the matter?

Mr. Wardle, in replying, said he was informed by the Company that there were no Lascars employed at their Greenwich works. Two were recently engaged, but were not satisfactory, and left after two or three days' service.

Torquay Gas Company.—The annual meeting of the Company was held last Tuesday—Mr. J. F. Rockhey presiding. The Directors' report showed a balance of £8519 to the credit of the profit and loss account. After allowing for the interim dividend, a full year's dividend was declared. The increase on the sale of gas amounted to nearly 10 p.ct. over 1916, which was the largest increase experienced for many years. The sale of gas was 196,966,000 c.ft. in 1916, against 216,010,000 c.ft. in 1917; the revenue was £60,722, against £44,800; and the expenditure £43,612, against £38,566. The balance to profit and loss account was £7160, against £6243. The additional sale of 19,014,000 c.ft. represented £3304; and the rise of 4d. per 1000 c.ft. meant an additional income of £2090. Coal cost £22,965, against £21,013; oil £3194, against £2948; coke and breeze £1462, against £866; wages £3365, against £2699; repairs £4359, against £2285; distribution charges £3013, against £4056. The report was adopted.

THE "FINANCIAL HARDSHIPS" BILLS.

CONSUMPTION OF GAS AND ELECTRICITY TO BE CURTAILED.

Statement by the President of the Board of Trade.

The House of Commons debate last Wednesday on the shipbuilding position was interrupted at 8.15, in order that, in accordance with arrangement, consideration might be given to the 24 Gas Bills which had been put down for second reading, and to the progress of which objection had been taken.

The President of the Board of Trade (Sir Albert Stanley), on the motion that the Brentford Gas Bill be read a second time, said it might be well to indicate the restrictions which the Government found it necessary to place immediately upon the consumption of gas and electricity. Some months ago, the Board of Trade were approached by a deputation representing both gas and electricity undertakings, asking for assistance in the matter of financial hardships arising out of the war; so that the Board had for some time had a general knowledge of the whole position. A large number of gas undertakings operated under the sliding-scale; while others were subject to a maximum charge. These provisions were fixed by Parliament in normal times, without reference to abnormal conditions; and the war had made it necessary to deal with a position such as confronted them now. He was not proposing at this juncture to enter into the merits of the particular proposal put forward by the companies, beyond observing that, in so far as the information available to the Board of Trade was concerned, it was clear that there was no case—or certainly there was not at the time the Bills were introduced—for a general and indiscriminate relaxation of statutory requirements; and it was necessary that each case must be examined upon its merits, if it should be decided that any relief under the circumstances was desirable. There were two courses only which appeared to be practicable. One was the promotion of a Private Bill, and the other for the Board, or some other Department, to present a General Bill which would place upon a Government Department the responsibility of considering the merits of each application, and of making Orders if desirable. The Board had been very reluctant to assume the responsibility of bringing in a Bill of this nature without having some indication of the policy of Parliament. It had been the view of the Department that, inasmuch as the sliding-scale had always been regarded somewhat in the light of a parliamentary bargain, no modification whatever of it should be made until the principle involved had been considered by a Parliamentary Committee. This was the position when the Bills were introduced. But since then a very considerable change had taken place—or was about to take place—which must materially affect most, if not all, of the gas and electric undertakings in the country. It would not be possible henceforward for the necessary transport to be secured for supplying all these great public undertakings with the requisite amount of coal; and, in addition, the withdrawal in the near future of a considerable number of men from the mines must alone have the effect of reducing the output of coal in the country. It was, however, primarily a problem of transport. It had been found necessary to withdraw from the coasting service a number of steamers which had been engaged in the transport of coal to the Southern ports; and the withdrawal of these steamers would place on the railways an extra burden. The amount of coal which these steamers had been carrying was in round figures 3,000,000 tons per year. According to calculations, it would not be possible for the railways to carry more than one-half this amount. Therefore, they must find ways whereby they could bring down at once the consumption of coal—particularly in the Southern parts of the country—so that this additional 1,500,000 tons need not be transported. It was not intended to make these restrictions uniform throughout the country. Those districts which were nearer to the coalfields need not, at present, be placed under quite the same restrictions as would be necessary in those areas which were more remote from the collieries. But it was imperative that all possible economy should be exercised everywhere. The restrictions it was proposed to make were the minimum which the circumstances demanded. It might be that they would not produce the desired results; and, if so, it would be necessary to extend them later on. It was highly desirable that everybody should, if possible, go below the restrictions suggested, and exercise every practicable economy in the use both of gas and electricity. It was quite clear that it would be impossible for the undertakings themselves to ration their consumption of coal. They could only manufacture gas and electricity, and could not control the use of these commodities. Therefore they must establish some system of rationing the consumers; and it was proposed to issue an Order within the next few days to restrict the consumption of these commodities over a very considerable area. It was proposed that, as regarded Great Britain, no lights should be used for the purpose of illuminating shop windows; no food should be cooked, or any hot meals served, in any of the hotels, clubs, inns, restaurants, public eating, refreshment, or boarding houses between 9.30 at night and 5 o'clock the following morning, and that all lights in the dining-rooms of these places must be extinguished between 10 o'clock at night and 5 o'clock the next morning; no performances in any theatres, music halls, cinemas, or other public places of amusement should be continued after 10.30 at night, nor should they be re-opened before 1 o'clock on the next day, and all lights must be out between those hours, with the exception of what were actually required for the use of the employees. Then, south of a line drawn across the country from the Wash to the Bristol Channel, it was proposed that all users of gas and electricity should be restricted to five-sixths of the amount consumed in the corresponding quarter of last year. This restriction was subject to a minimum allowance below which the consumption need not be reduced. This particular area was affected more than other parts of the country, because it was so remote from the coalfields, and because this was the part which heretofore had been served very largely by the steamers which had had to be withdrawn. It would, of course, be necessary to make certain exceptions—such as munition works, hospitals, nursing homes, &c. It was also proposed to ration all the large power stations from which current was supplied for tramway and railway undertakings. Further, it was intended to extend to the greater part of England the scheme of rationing of household coal which had been applied to London during the present winter. But this rationing would have to be done during the next winter on a considerably reduced scale as compared with that in London. It would be necessary that the scale of rationing in London next winter should be considerably less than this past winter. Ireland, too, he was sorry to say, must suffer some restriction. It was clear that the restrictions he had outlined must, in themselves, affect not only those undertakings which had Bills before the House, but also many others. It therefore seemed undesirable to proceed with these Bills at the present time. The course he proposed to take was that a Select Committee of the House of Commons should be appointed to consider whether any temporary modification of the existing statutory requirements in the matter of price and dividends, or any other form of relief, should be afforded in the case of those undertakings whose financial circumstances had been, or might be, injuriously affected by causes arising out of the war. Such a Committee would give the House the necessary guidance to enable them to determine whether these Bills should be allowed to proceed, or whether some other method should be adopted which would afford relief to any gas or electric undertakings where financial hardship had been shown. The setting-up of a Select Committee would offer an opportunity to the House to indicate its opinion on these matters. If this course were agreed to, he would take the earliest opportunity of moving the appointment of the Committee, with a request that they should report as soon as possible. Until that time, the Bills should be held in abeyance. This seemed to be the easiest and speediest way of dealing with an exceedingly difficult problem.

Sir Fortescue Flannery pointed out the need for accelerating the proceedings of this Select Committee, as otherwise it would be impossible for sufficient time to remain during the present session for the Private Bill Committees to inquire into each of the separate Bills. If the Select Committee took anything like the usual time, he added, these Bills, some of which were urgent in regard to other matters quite distinct from the question of coal consumption and the sliding-scale, would run the risk of being lost.

Mr. Hudson wanted to know the terms of reference to the Select Committee. He said that, in addition to finance, the Brentford Gas Bill had to do with the taking-in of a large tract of land and transferring the gas-works from Brentford to Chiswick—seriously interfering with a proposition that was laid down before the war for town planning. This was also a matter to be fully inquired into.

Mr. Rowlands said, if they were to have this Committee, it meant that the Government required it for the purpose of seeing what were their responsibilities towards these undertakings. Their duty in the House was to protect the consumer; and it was in this interest that many of them had fought these questions from time to time. The consumer had borne more than his fair share of the burden caused by the war. The gas companies had always seen that their standard price was not fixed too low. A great deal depended upon the reference to the Committee. Many of them would want the Committee to have very wide powers indeed. They would want them to decide, if there was to be some compensation paid to these companies, and the Government required the bye-products for their own purposes, and for their own purposes reduced the supplies, whether this should be a national compensation, and not a compensation to come out of the pockets of the consumers. He hoped that when they came to these Bills individually, they would have the same opportunity to deal with them as they would have had if the procedure now suggested had not been adopted.

Sir Henry Harris said he had been asked by the London County Council to oppose the reading of some of the Bills. Though it was perfectly true that war conditions had told very hardly upon the producers of gas, they had also told very hardly upon the consumers. The present effect of the war conditions had been that six-sevenths of the additional cost had been thrown upon the consumers; and if the proposal before the House was also to throw the one-seventh on the consumers, he hoped, in preparing the reference to the Committee, due regard would be had to the consumers' interest. Very strong objection would be taken to interference with the sliding-scale; and a strong case would have to be made out if this were to be done.

Mr. Holt remarked that it seemed to him that both the consumers and the owners of gas undertakings had grounds for saying that they suffered from the same circumstances in connection with the sliding-scale. The Government first of all forced up the wages; and, secondly, they had artificially curtailed the price of the gas companies' bye-products. These two steps had prejudiced both the companies and the consumers; and he hoped the Committee would be enabled to go fully into the question whether the progressive forcing-up of wages and the restriction of the prices of bye-products by the Government could either of them be justified.

Mr. Burns trusted that the Select Committee would be allowed time to consider the subject in all its aspects. He objected to three of the gas companies whose Bills were down that night using them as the medium for attempting to smuggle through the House, for war reasons and under war conditions, proposals that had no relation whatever to the cost of transport or of labour, or the sliding-scale, or anything of a financial character, which all of them, more or less, were quite willing, owing to the pressure of the war, that the Board of Trade and the companies themselves should mutually and equitably adjust. He then

went on to deal with the proposal in the Brentford Gas Bill to acquire a site at Chiswick for the erection of new works, and appealed to the President of the Board of Trade not to allow such a proposal to be inserted in a Bill of this kind. The reference to the Select Committee should be rigidly confined to war conditions and the financial position arising out of the alterations to be agreed upon by Parliament in the sliding-scale. Unless this were done, the House would do its very best to oppose every one of the Bills.

Mr. Whitley (Chairman of Ways and Means) assured the several speakers that the Select Committee would deal solely with the question of the sliding-scale as affected by war conditions and restrictions; and if any other parts of the Bills remained, they would have to be dealt with by another process. He moved the adjournment of the debate until April 11, to give the promoters of the Bills time to let him know, under the new circumstances, what was their position. Then if the House adopted the proposal of the President of the Board of Trade, he would postpone all the Bills for a further period, in order to hear the views of the Select Committee.

The motion was agreed to, and the second reading deferred until Thursday, the 11th prox.

OPPOSITION TO LONDON GAS BILLS.

In a report to the Lambeth Borough Council, the General Purposes Committee state, with reference to local Gas Bills, that the London County Council were asked if they will be represented by Counsel before the Committee of both Houses. If the Special Committee throw out the principle, it is understood the Bills will be withdrawn. If, on the other hand, the Bills are proceeded with, the question has been left open for future consideration as to whether opposition upon any details of the clauses should be pursued hereafter.

With regard to the Lambeth Borough Council's petition against the Gas Light and Coke Company's Bill, the promoters have given notice of their intention to object to the Council's *locus standi*; their contention being that a Metropolitan Borough Council is not "the municipal or other local authority of any town or district" referred to in Standing Order No. 134 of the House of Commons, and that, in view of the fact that the County Council are also opposing the Bill, it is not fair to have two local authorities claiming to represent the consumers in the same area.

A somewhat similar question, the General Purposes Committee say, was raised in 1902 on the London County Council Tramways and Improvements Bill, under Standing Order 134, the words of which are similar—namely, "the municipal or other authority having the local management of the Metropolis or of any town or district"—and it was there held that the City Council of Westminster were entitled to be heard under the Standing Order. The question raised is not only one of present, but future, importance to the position of the Metropolitan Borough Councils; and as the Town Clerk's Parliamentary Agents were of opinion that the objection should be appeared upon, the Town Clerk was authorized to instruct his Agents to take all necessary steps to uphold the *locus* of the Council.

The Town Clerk reported that he had received an intimation from the Parliamentary Officer of the London County Council that it was the Council's intention to pursue their petition at all stages before the Committees of the two Houses.

Reporting to the Heston and Isleworth Urban District Council, the General Purposes Committee say that a letter has been received from Messrs. Lees & Co. (the Council's Parliamentary Agents), intimating that the London County Council (who are opposing the Brentford Gas Light and Coke, South Metropolitan, Commercial, and South Suburban Gas Bills) feel they cannot allow the second reading of the Bills to pass unchallenged. There has accordingly been organized opposition to the second reading of the Bills. It was suggested that local authorities who were opposing the Bills outside London ought to know the attitude the London County Council were taking, so they might ask their Members to support the London Members in the opposition to the second reading of the Bills. In accordance with this, a letter was sent to Mr. W. Joynson-Hicks, Member for the Division, suggesting that he should support the London Members in the opposition to the Bills; and a reply has been received from him stating that he is in a difficulty in the matter, owing to the fact that, as Member for the district, he has nominally put his name on the back of the Brentford Gas Bill, and has also sponsored a similar Bill for Kingston, as Sir George Cave, the Member for that division, is a Minister.

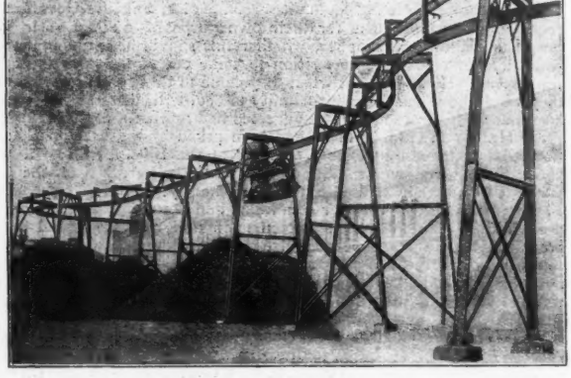
GAS FOR MOTOR VEHICLES.

The shortage of coal supplies and transport, and the necessity for further economies in the consumption of coal gas, have compelled the Board of Trade to reconsider the position with regard to the use of gas in substitution for petrol in motor vehicles. While it is not proposed to withdraw, nor to invalidate, permits which have already been issued, it is regretted that no further gas permits can be granted except for public utility services operating North of the Southern Boundary of Durham and Westmoreland.

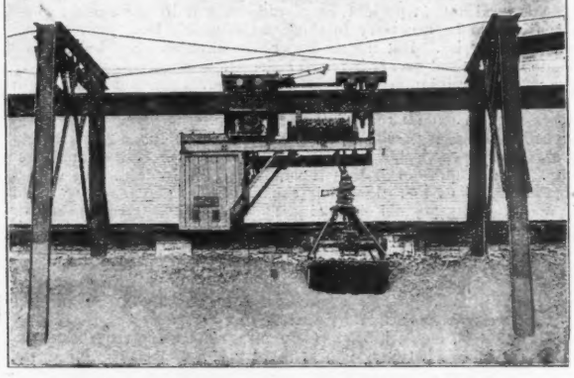
At Bow Street Police Court, last Thursday, Sir Thomas Beecham was fined £5 for having contravened the Petrol and Gas Restriction Order by causing gas to be used for driving a motor vehicle for purposes not authorized. For the defence, Mr. Harry Wilson said his client held a permit for a gas installation for his motor-car; and he considered that under it he was entitled to use it for the purposes of his profession, where a journey could not be otherwise conveniently and reasonably accomplished. He desired to comply with the law. The Magistrate, however, said he did not think it could be maintained

MONO-RAIL HIGH SPEED TELPHERS

OUR SYSTEM reduces MAINTENANCE to a MINIMUM.



TELPHER HANDLING HOT COKE DIRECT FROM THE RETORTS.



TELPHER WITH SPECIAL GRAB WORKING ON COKE HEAP.

OUR MACHINES are BUILT to SUIT the REQUIREMENTS.

STRACHAN & HENSHAW, Ltd.,

Telephone: BRISTOL 432. WHITEHALL IRONWORKS, BRISTOL. Telegrams: "STRASHAW, BRISTOL."

that the journey for which the car was used in this instance could not have been conveniently and quite reasonably accomplished otherwise. Earlier in the week, at the same Court, Miss Cicely Debenham, an actress, was fined £5 for causing gas to be used for driving a motor vehicle from her residence to a theatre.

Messrs. Brannen & Co., of No. 43, Edgehill, Shudehill, Manchester, have prepared a map showing the gas-charging stations within a radius of 40 miles of Manchester. In this area, close upon eighty gas-supply stations are indicated by black dots; and in addition there are given the addresses, hours of business, price, connection, &c.

The "Commercial Motor" says that it would be difficult to conceive a simpler and more efficient means of expediting and facilitating the charging of gas-bags than that introduced by the Croydon Gas Company. It has been evolved essentially to meet the requirements of local tradesmen, since this Company, in common with many others, consider that the claims of local patrons should receive first consideration. When the applicant has secured his official permission to use coal gas for his vehicle, he presents his car to the head office. His bag is then measured and officially stamped with its rated cubic capacity—250, 400, 500 c.ft., as the case may be. The owner is next given a small card or certificate on which are inscribed his name, address, description of the vehicle, its registered number, and the capacity of its gas-container in cubic feet; and it is completed by the signature of the Acting Engineer to the Gas Company. The owner, upon presentation of this card, is free to have his container charged at any station within the Company's territory, without metering the gas. The arrangement has proved eminently satisfactory to both the Gas Company and the user. It appreciably facilitates and expedites filling.

PROPOSED NATIONAL SULPHURIC ACID ASSOCIATION.

An Organizing Committee Formed.

A largely-attended meeting was held on Friday afternoon at the Cannon Street Hotel, E.C., of the sulphuric acid manufacturers of the United Kingdom, to (1) receive from the Vigilance Committee appointed at a meeting on Nov. 24, 1916, a general report as to negotiations which have taken place with Government Departments in the interval and, generally, developments arising therefrom; (2) consider the recommendations of the Post-War Sulphuric Acid Committee's report [dealt with on p. 489 of the "JOURNAL" for the 12th inst.], and to determine, if approved, on the formation forthwith of a National Sulphuric Acid Association as recommended therein; and (3) appoint, in the event of such an Association being determined upon, an Organizing Committee. The chair was taken by Mr. MAX MUSPRATT (the Chairman of the United Alkali Company, Ltd., of Liverpool), a member of the Vigilance Committee.

REPORT OF THE VIGILANCE COMMITTEE.

Mr. J. KING STEWART (one of the Joint Secretaries to the Committee), at the outset of the proceedings, read the report of the Vigilance Committee, in the course of which it was stated that, as a result of the activities of the Committee, a deputation of sulphuric acid and fertilizer manufacturers waited upon the Minister of Munitions in January of last year, to set forth the views of the trade as to sulphuric acid plants erected by the Government during the war, and zinc concentrates. The deputation were courteously received by Dr. Addison (then Minister of Munitions) and Sir Albert Stanley (President of the Board of Trade). Colonel Hall-Walker, M.P., who had taken a keen interest in the matter from the very outset, introduced the deputation; and, as a result of the deliberations, a Departmental Committee, under the chairmanship of Mr. Edward Shortt, K.C., M.P., were appointed to consider the position of the sulphuric acid and fertilizer trades as affected by the new acid plants erected during the war for the Government by the Ministry of Munitions. One of the recommendations of this Committee was that a National Sulphuric Acid Association should be formed at once; and the present meeting had been called to elect an Organizing Committee, to arrange and report on the details of the Association's constitution, but also, by way of prelude, to agree that a deputation should wait upon the President of the Board of Trade to seek an assurance that the recommendations contained in the Departmental Committee's report would be carried into effect. One of the interim recommendations of the Committee led to the appointment of a Joint Committee of Acid and Fertilizer Manufacturers and Zinc Smelters. This Committee had already reported to the Ministry of Munitions; and it was hoped that the development of the zinc industry in the United Kingdom would proceed in conjunction with acid interests.

A LETTER FROM THE MINISTRY OF MUNITIONS.

Appended to the report was a copy of a letter from Major Adrian Corbett, of the Ministry of Munitions, in which the author said: "It was a matter of great satisfaction to Lord Moulton and the members of the Explosives Department to see a copy of the notice summoning a meeting of the sulphuric acid manufacturers of the United Kingdom for the purpose of considering the recommendations of the Post-War Sulphuric Acid Committee's report and the formation of a National Sulphuric Acid Association. The chemical and fertilizer manufacturers of the United Kingdom have played a part second to none in the prosecution of the war; and their self-sacrificing patriotism during the war is a good omen for the still more important conflict that will take place after the war to maintain this country's supremacy in commerce. If, as appears to be the case, they are prepared to sink private considerations, and fight shoulder to shoulder in the great struggle, I am sure that they will prove to be irresistible." Major Corbett concluded: "As far as I am aware, the sulphuric acid industry was first in the field in demanding early consideration of what will happen in the future; and now that its problems have been considered, it is still

THE MAIN LINES

The No. 42 Cooker.

For All Times.

"D.S.O." Fire.

These are Safe Lines. *Write for Prices and Deliveries.*

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N. 18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOWROOMS and BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

showing the way to other industries by creating the machinery to carry out the decisions to which it has already come."

The Chairman, in proposing the adoption of the report, pointed out that the previous meeting of the sulphuric acid trade took place more than a year ago. They then met in a time of very grave crisis and anxiety to the trade. He ventured to claim for the Vigilance Committee and the various gentlemen in Government Departments and elsewhere who had taken an interest in this subject, that the present meeting was taking place under far different conditions. The Departmental Committee who had investigated the question of sulphuric acid in a manner in which it had never before been investigated in this country, had broadly and in the main confirmed all the statements that were made at the previous meeting to which he had referred. They had gained a complete victory in the first round of their operations; but they must push the matter further, in order that after the war the sulphuric acid trade might remain, as it had been in the past, one of the great bulwarks of the country, but based upon infinitely better conditions for everyone concerned than had been the case hitherto. Of course, with an article like sulphuric acid, every kind of interest had to be considered—the consumers, the producers, and even the broad national interest. They had so to deal with a grave national problem that in the future they would have none of the difficulties of the past.

The motion was seconded by Mr. Chadwick, of Manchester (as a small manufacturer), and agreed to.

The Departmental Committee's Recommendations.—An Organizing Committee Appointed.

Sir William Pearce, M.P., then proceeded to deal with the remainder of the agenda by proposing the following resolution:

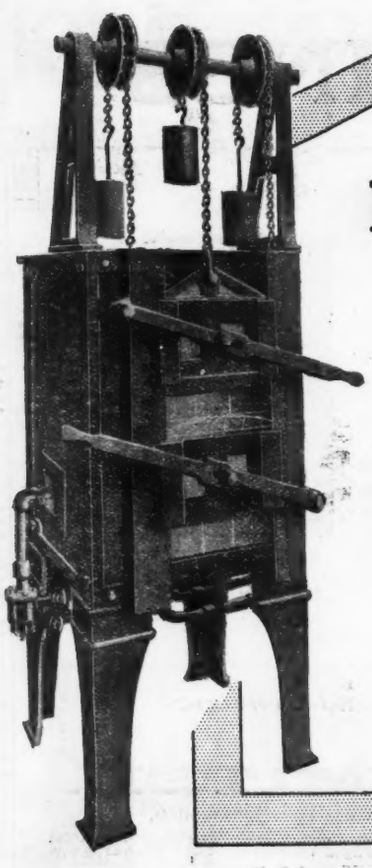
(*a*) That this meeting of the sulphuric acid manufacturers of the United Kingdom, which has been summoned for the purpose of considering the report of the Departmental Committee on the Post-War Position of the Sulphuric Acid and Fertilizer Trades, and particularly the recommendation therein as to the formation of a strong National Association of Sulphuric Acid Makers of a representative character, expresses its acquiescence in that recommendation; but, as an indispensable prelude to the formation of such an Association, desires that the Sulphuric Acid Trade Vigilance Committee should, with such other persons as it may consider it desirable to appoint, solicit an interview with the President of the Board of Trade, or with any other Minister or Ministers concerned, for the purpose of urging and receiving an assurance that the recommendations contained in the Departmental Report referred to will, so far as H.M. Government is concerned, be carried into effect.

(*b*) That the Vigilance Committee hereinbefore referred to and the Sulphuric Acid Advisory Committee to the Ministry of Munitions appointed by the Association of British Chemical Manufacturers and the Fertilizer Manufacturers' Association, together with two representatives of the Gas Council and two representatives of the explosives' industry, and a duly elected representative of the London and South of England Sulphuric Acid Association, the South Wales Sulphuric Acid Association, the Midland Sulphuric Acid Association, the Yorkshire Sulphuric Acid Association, the Lancashire Sulphuric Acid Association, the North of England Sulphuric Acid Association, and the Scottish Sulphuric Acid Association, with power to add to their number, be requested to act as an Organizing Committee, to arrange the details of the projected Association's constitution, and to report.

He said that, speaking as a member of the Departmental Committee, he could tell them that the trade members of the Committee did not have a very easy job to begin with. They had to prove that there would in all probability be a large surplus of sulphuric acid after the war. Unfortunately, from his point of view, there were certain figures which it had been thought advisable to omit from the report; and this had robbed it of a great deal of its value. But without disclosing anything that could be of importance to the enemy, he thought he might say they had established the position that the production of sulphuric acid, due to war conditions, had increased roundly by about 1,000,000 tons of chamber acid; and that, taking all demands for fertilizers, &c., into account, the conditions after the war would not be likely to absorb all this. There would be a possible surplus of about 350,000 tons a year. It was a very critical position for the whole trade. The Departmental Committee strongly recommended the formation, as quickly as possible, of a National Association of Sulphuric Acid Manufacturers; and they would have to consider the form that such an Association should take. They had not met now to decide how far the Association should go; but it was clear that combination of interests was "in the air."

Mr. Edgar P. Chance (Hon. Secretary of the Vigilance Committee), who seconded the motion, remarked that for something like two years he had advocated the formation of an Association of this kind. It was peculiarly significant that the Government report should favour such a step. The difficulties of the last few years had convinced everybody that it was no longer possible to work as an isolated individual. The Organizing Committee to be appointed should be thoroughly democratic, and representative of all sizes and kinds of makers. One of the most important matters to consider would be the exact functions of such an Association as was proposed. They must arrange to deal with local matters locally, and treat the National Association as a sort of House of Lords.

The Chairman, in reply to questions, pointed out that there was power to add to the number of representatives on the Committee; but it would be obviously impossible for every manufacturer in the country to be represented. If, however, it were shown that any interests were not represented, he could not imagine that they would not be accepted. Asked what was a sulphuric acid manufacturer, he replied that they included everybody who was upon the books of the Ministry



DAVIS
High-Speed Steel
Furnaces

The Davis "D.H.S.T." series of Gas-Fired Furnaces have been specially designed for the hardening of modern High Speed Steel Tools, and to provide the maximum of convenience and efficiency at the least practicable fuel cost.

The firing element consists of Davis PATENT Air-Blast Burners, for gas at ordinary main pressure and air at 3 lbs. per sq. inch. Two chambers are provided, each fitted with rise-and-fall door complete with counter-balance gearing and actuating levers. A pre-heating temperature of 1000°C. is attainable in the upper chamber, the lower one reaching 1500°C.; whilst the flame does not impinge on the work.

Illustration shows the D.H S.T. 200 Series (working spaces from 11 in. × 9 in. × 4½ in. to 21 in. × 18 in. × 9 in.). **Prices from £39 complete.** Write for lists F 18 A. B. and C. (gratis).

The Davis Furnace Co. Proprietors: The Davis Gas Stove Co., Ltd.
The Diamond Foundry - - LUTON.

as producing sulphuric acid. A query as to whether they could have some assurance that new plants would be considered as plants that should be kept on after the war, in order to produce the largest amount of sulphuric acid at the lowest cost, he expressed the opinion that this was going much too far for the present meeting. It was a matter which would have to engage the attention of the Association when formed. Another question was whether, if it were decided to start an Association, the smaller manufacturers would have their interests looked after; and to this the Chairman replied that, so far as he personally was concerned—and he felt sure he could speak for the other members of the Vigilance Committee, who represented perhaps from 75 to 80 p.ct. of the trade—there was every intention to formulate a scheme which would be fair and square towards everyone.

The resolution was then put to the meeting, and carried *nem. con.*

Mr. EDWARD SHORTT, K.C., M.P., answering a call from the chair, said that, as Chairman of the Departmental Committee who had recently reported on the subject, he had learned a great deal about sulphuric acid. He attached importance to no one of the Committee's recommendations more than he did to that of association. He was convinced that association—trade combination for legitimate purposes—was essential for the sulphuric acid industry; but, upon the other hand, added the speaker, amid laughter, "I have only lately been appointed Chairman of a Committee to report on what safeguards are necessary to protect us against trade associations of this description." The trade would be doing itself the greatest possible good if it really did come together in a truly representative combination. When this was done legitimately, what was for the good of the sulphuric acid trade would be for the good of the industrial concerns of the country. What was good for one great trade like theirs must be good for the community.

Colonel W. HALL-WALKER, M.P., remarked that he had taken a great deal of interest in the sulphuric acid trade, seeing that for many years he had represented in Parliament one of the centres of the industry. It was essential that they should co-operate for the purpose of maintaining their principles. Any representations they might desire to make, he would see were directed to the proper quarter.

This concluded the business; and the meeting separated, after passing a hearty vote of thanks to the Chairman, on the proposition of Mr. A. P. CROSS.

Lichfield Gas Company.—At the annual meeting of the Company, the Chairman (Alderman G. Haynes) made sympathetic reference to the loss sustained by the death of the late Chairman (Alderman H. M. Morgan). Referring to the accounts, he regretted that there was a continued decrease in revenue. The abnormal cost of production necessitated a reduced dividend; and the Directors felt compelled to increase the price of gas 3d. per 1000 c.ft. Since the war the Company had only raised the price of gas 25 p.ct., while the cost of coal had increased 40 p.ct., the total wages 29 p.ct. (with a reduced staff), and other materials from 50 to 100 p.ct. in price.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

March 25.

The average values for gas-works products during the week were: Gas-works coal tar, 28s. to 32s. Pitch, East Coast 20s. to 25s. per ton; West Coast—Manchester 18s. 6d. to 19s. 6d., Liverpool 19s. 6d. to 20s. 6d., Clyde 19s. 6d. to 20s. 6d., nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. 10d. to 4s. Heavy naphtha, North, 2s. 3d. to 2s. 6d. Creosote, in bulk, North 4d. to 4¼d. Heavy oils, in bulk, North 4¼d. to 5d. Carbolic acid, 60 p.ct. East and West Coasts, 3s. 4d. naked. Naphthalene salts, 60s., bags included. Anthracene, "A" quality, 4d. to 6d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Plants are working to fullest capacities; but yet the demand for all products necessary in the carrying on of the war remains as heavy as ever. New installations are being put down, and existing plants are being added to, as rapidly as possible; but, unfortunately, this is a slow process, owing to the difficulties of obtaining materials and labour under present conditions. It is interesting to note that, among companies adding to their installations, is the Powell Duffryn Company, who are erecting a large tar distillation plant. Pitch maintains a steady tone; the recent tendency to further improvement being still more in evidence in the North than elsewhere. Manchester now makes 24s. 6d. to 25s. per ton. The shipping position is still seriously affected by the lack of tonnage; and no improvement is likely for some time to come—in fact, it is conceivable that conditions may easily become worse before any improvement results. Considering the adverse circumstances, the strength of export quotations is remarkable, and is due to the fact that a very heavy French demand is known to exist. East Coast prices are about the same as lately ruling; but London is a shade firmer. There are no fresh developments in tar. Refined naphthalene has a dull tendency, on account of the difficulty of handling export business; but all kinds of crudes keep remarkably firm under a heavy demand, especially for lower grades, which is rather exceptional for the time of year. Naphthas are without change. It is now thought that quotations will not move materially from present level, and that all further restrictions relating to this product will be avoided. Cresylic acid is very firm, and tends to higher quotations. Aniline oil is dull. Benzol, toluol, creosote, and carbolic acid are all going into consump-

"PIONEERS" OF BLUE WATER GAS
FOR "JOINT USE" WITH COAL GAS.
DEMPSTER'S COMBINATION OF
C-W-G- AND
BLUE WATER GAS
APPARATUS "IS NECESSARY."
R. & J. DEMPSTER, LTD.,
MANCHESTER.
London Office:
34, VICTORIA STREET,
WESTMINSTER, S.W.1.

tion for war purposes as fast as produced, and private trade in these products is practically at a standstill. Anthracene is dull and lower.

The range of quotations is as under:

Aniline Oil (pure): 1s. 4d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 32s. 6d. to 35s. Midlands 27s. to 29s.; North 28s. to 30s. per ton, *ex* works.

Pitch: London 48s. to 50s. f.o.b.; East Coast, 26s. to 28s. f.o.b.; West Coast—Liverpool 22s.; Manchester 24s. f.a.s.; Clyde 27s.

Solvent Naphtha: Naked London 90-190% 3s. to 3s. 3d.; North 2s. 9d. to 3s. per gallon; 90-160% naked London 4s. 3d. to 4s. 6d.; North 4s. to 4s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4½d. per gallon); heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included, *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Conditions do not alter very much, and there are no fresh developments of importance. The various propositions for the synthetic production of ammonia, both here and in the United States, are being followed closely by all parties concerned, and especially by the maker of sulphate, as any universal adoption of synthetic processes would prove serious competition for the present makers. Whether the present heavy demand will be continued and increased after the war, so as to absorb not only the amount of sulphate now being used for explosive purposes but also the quantity produced synthetically, without a reduction in price, or, if price must be reduced, an increased volume of business can be done, are questions that are providing much food for thought. Meanwhile, business is up to capacity and booked months ahead.

The position in America appears to be assuming a more normal state on the improvement in the coal situation.

Gas Manager's Conditional Exemption.—At Todmorden Tribunal, recently, Mr. F. V. Barnes, Manager of the Corporation gas-works, aged 37 and married caused some merriment by remarking that "he thought he was on duty about 25 hours a day." He had to leave the Volunteers because he could not find time to attend. The works were turning out a lot of material for munitions. He was given conditional exemption.

The Glasgow Gas-Furnace Rooms.

Subsequent to the recent lecture, on gas-furnaces, delivered by Mr. Ralph Halkett to the Scientific Society of the Royal Technical College, Glasgow, some fifty members visited the Gas Department Furnace Demonstration Rooms, Milan Street, last Saturday week. The party were met and welcomed by Councillor Somerville, the Convener of the Gas Sales and Distribution Committee, and Mr. Halkett, the Assistant General Manager of the Gas Department. Mr. M'Isaac, the Furnace Expert, then demonstrated the various furnaces installed; and he was followed very keenly, and with great interest, by all present. The party were later served with tea; and Councillor Somerville then gave a brief survey of the department, showing how beneficial the particular operations they had seen that afternoon had been to the many engineering works in Glasgow, and assisting in the greater output of munition work. It had, he said, been proved that gas-furnaces were playing a very important part in the present war, and that they were able to turn out certain classes of material cheaper and more quickly than by any other method. Mr. Halkett corroborated these remarks, and pointed out that anyone who was in difficulty, either as to the adoption or working of gas-furnaces, if he only applied to the department, expert advice would be given, and doubtless the difficulty would be overcome. A discussion followed, and many questions were answered by Mr. M'Isaac. A vote of thanks was accorded to the Gas Committee and the officials for the facilities to view the furnaces in actual operation.

Obscuring Lights.—With the coming into force of Summer Time, the hours for drawing blinds have been altered; but it is now added that, when a raid warning is given, requirements as to obscuring or extinguishing lights apply at once, whatever may be the hour specified in the order.

Glasgow and Gas Restrictions.—In connection with the restrictions imposed on the consumption of gas by the Board of Trade, it is not anticipated that much relief will be afforded to the municipal undertaking in Glasgow. The activity in production by the Gas Department has been due to the large consumption by munition works, operating day and night, and drawing power as well as light from the public supply. The prohibition of lighting in shop windows may ultimately have a slight effect in reducing requirements.

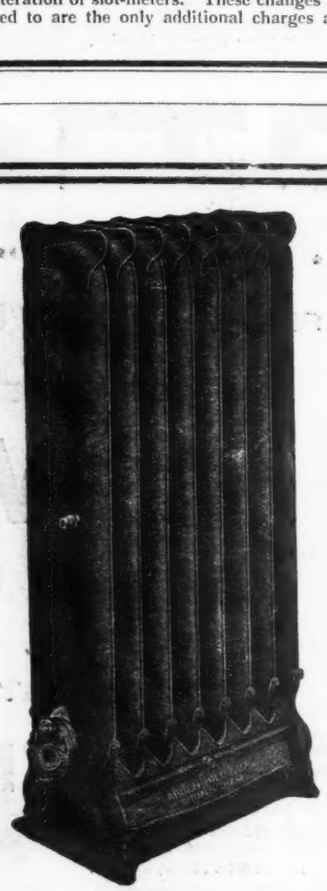
Gas Charges at Morecambe.—It was stated in the "JOURNAL" a fortnight ago [p. 515] that the Morecambe Gas Committee had advanced the price of gas by ordinary meter 3d. per 1000 c.ft., as from April 1, and had fixed "an additional rent of 1s. per quarter on slot-meters." Mr. R. H. Ruthven (the Engineer and Manager) points out that this is not quite accurate, as no rental for slot-meters has been charged previously. The present object of the Committee is to avoid, if possible, the alteration of slot-meters. These changes notified in the paragraph referred to are the only additional charges above pre-war rates.

THE "MARS"

- - GAS-HEATED STEAM - -

RADIATOR

THE "Acme" of perfection in heating, it is entirely self-contained and requires no steam or water connections. The heat is regulated by an automatic gas-valve, an even temperature is maintained, and consumption of gas economized. It is flueless and odourless. Quite simple and cheap to instal, its maintenance cost is low, and it heats a room with less gas than is required to light it. Ideal for large offices, workrooms, halls, churches, and public institutions.



DOUBLE-COLUMN RADIATOR.

Write for Special Booklet, "Healthful Heating," to

ARDEN HILL & Co.

"ACME" WORKS - - BIRMINGHAM.

Dearer Gas Forecasted in Edinburgh.

A rather piquant discussion took place at the meeting of the Edinburgh and Leith Gas Commissioners on Monday of last week, as to the price to be charged to the Corporations of Edinburgh and Leith for gas to be supplied to the public lamps and stair lights for the ensuing year. Provost Lindsay, of Leith, explained that it had been customary in normal times to fix the price of gas for these purposes at the current rate to ordinary consumers; and if this practice were followed, the rate would be 3s. 8d. per 1000 c.ft. The times were, however, anything but normal. He anticipated that when the accounts were made up to May 15, a deficit of at least £10,000 would be revealed, and that the price to ordinary consumers would have to be increased by 6d. per 1000 c.ft., making it 4s. 2d. He moved that the recommendation of the Commissioners to charge the Corporations 4s., as from May 15, be approved. Councillor Stark moved disapproval, and contended that the arrangement which had existed for so many years should stand. He pointed out that the sale of gas during the current year had greatly increased, which should add to the profits. It was a leap in the dark to say there would be an increase of 6d. in the ordinary consumers' rate. Councillor Douglas Elliot, the Convener of the Works Committee, said it was simply a case of facing the matter now or later. They should not sell gas to public authorities at a price which would bring about a deficit. On a division, the increase to 4s. was carried by 12 votes to 8. It was decided at the same meeting to approve of the conversion of the war bonuses paid to workpeople into war wages, on the understanding that the sums added to the ordinary wages should not be taken into account for superannuation purposes.

Darwen Gas Prices Increased.—The Darwen Gas Committee have decided that the price of gas shall be increased 3d. per 1000 c.ft. from April 1, and that the amount of gas by prepayment meters be reduced from 24 to 20 c.ft. for 1d.

Advance in Price at Silsden.—The Silsden Urban District Council have decided to advance the charge for gas from 2s. 11d. to 3s. 1½d. per 1000 c.ft. It is estimated that, even if costs of labour, coal, and materials remain as at present, there will be an increased expenditure of £445 on the current year; and if there is any further advance in these costs, the 2½d. advance in charge is not likely to meet the need. The price was not raised at all until March of last year, when it went from 2s. 6d. to 2s. 11d.

Increase in Price at Staveley.—The Directors of the Staveley Gas Company have issued a notice to the consumers stating that, in consequence of the increased price of coal and other requisites, wages, &c., they are compelled to raise the price of gas, and that the discounts hitherto allowed to ordinary consumers will be discontinued. Discount will still be allowed on engines. The increased prices of gas are to consumers of gas through ordinary meters 5d. per 1000 c.ft., and prepayment consumers 4d.

Communal Kitchens.

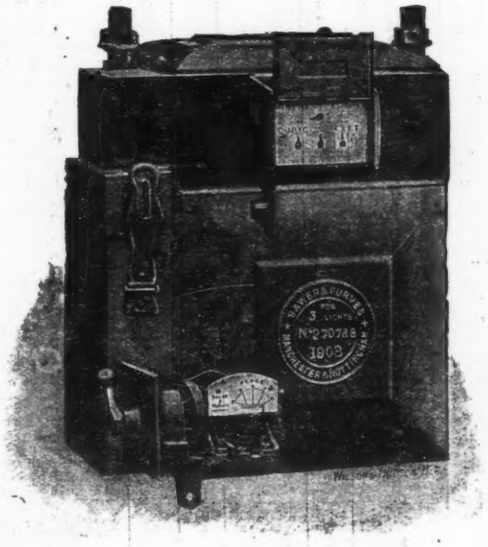
Our contemporary the "Ironmonger" has, in the two last issues, given plans of the people's kitchen at Hammersmith and of the Westminster national kitchen. The former is a model for large municipal requirements, supplying about 6000 customers a week. The kitchen being large, it was possible to introduce a steam-generating boiler for those cooking processes which can be done by steam. Consequently, the meat-boilers are steam-jacketed, the pudding steamers are heated by a supply from the boiler, while the sink-water is also heated by steam. Baking is done by gas-heated ovens, which are known as pastrycooks' ovens. The vegetable boilers are gas-heated, not steam; and this was due to the less first cost of the gas-boiler—"a boiler having a near relationship to the gas-heated washing copper, and which answers admirably." In the Westminster kitchen, on the other hand, all the appliances are heated by gas. For this type of kitchen, says the writer, the local ironmonger may not be called upon to supply the cookers; but there are appliances which are within his province, if he has a sheet-metal workers' shop. A useful form of steam-cooker is made of tinned sheet steel, really a simple sheet-metal cupboard, about 20 in. by 20 in. by 24 in. high, or larger, with perforated shelves. The special detail is the bottom, which is formed of an open water-pan holding sufficient water for one steaming. Under this bottom, a gas-ring is set to boil the water. The door must fit well, and can be held to the frame with one, or at most two casement fasteners. An aperture at the top (usually ¼ in. in diameter) lets the steam escape, and prevents undue pressure. The steam escapes into the kitchen, or may be led away through a pipe. Nothing could be simpler or less expensive to make; and it is quite safe.

The Swansea Corporation have decided to give up all the street lighting during "Summer Time."

At the annual meeting to-day, the Directors of the Davis Gas-Stove Company, Ltd., will report that the net profits for the year ended Dec. 31 amounted to £16,808, to which must be added the amount brought forward (£11,102), showing a total divisible profit of £27,910. Deducting from this the dividend on the 5½ p.ct. preference shares for the year, amounting to £2578, and the interim dividend on the ordinary shares at the rate of 5 p.ct. per annum for the half year to June 30, amounting to £1172, there remains a balance of £24,160. It is proposed to distribute £3515 in paying a dividend on the ordinary shares at the rate of 15 p.ct. per annum for the half year to December, making 10 p.ct. for the year (less income-tax); to add £3000 to the reserve account, making it £70,000; to add £3500 to the special reserve for termination of war contingencies, making it £8000; to contribute £2000 to the provident fund; and, after providing £908 for the proportion of profits payable to the Directors, there will remain £11,146 to carry forward.

MILES PLATTING,
MANCHESTER.

SAWER
and
PURVES.
(BRANCH OF METERS, LTD.)



PREPAYMENT
METERS.

RADFORD ROAD,
NOTTINGHAM.

AGENT FOR SCOTLAND
JNO. D. GIBSON,
2, Causeyside St.,
PAISLEY.

Price of Gas at Burnley.—The Burnley Corporation Gas Committee have reviewed their position, and come to the conclusion that the charge for gas must be increased 2d. per 1000 c.ft., bringing it to 3s. Since the previous increase a year ago, there has been a big growth in the wages bill. The Committee also gave the Town Clerk instructions to apply for power to increase the charge above 3s., if circumstances at any time warrant it.

Higher Gas Rates at Coatbridge.—The Coatbridge Gas Company announce that their gas rates for engines and furnaces are to be increased to 2s. 4d. per 1000 c.ft., and that rents will be payable on all ordinary meters. These alterations have become imperative, owing to the decision of the Committee on Production awarding the gas workers the bonus of 12½ p.ct. on their earnings, and also to the general largely increased costs of materials for the production and supply of gas.

Increase in Price at Monifieth.—The Monifieth Town Council, at a special meeting, unanimously resolved to increase the price of gas as from the date of the forthcoming meter-readings by 3d. per 1000 c.ft., bringing the rate up to 5s. 8d. The increase will affect both ordinary and slot consumers, and will remain in operation for the next six months. Mr. White (the Convener of the Gas Committee) stated that the increase was necessary in view of the higher cost of coals, materials, and wages.

The Drighlington and Gildersome Gas Company have announced an advance in gas charges of 6d. per 1000 c.ft. for all classes of consumption, from the March meter-readings.

The report of the Directors of Messrs. John Wright and Eagle Range, Ltd., for the year ended Dec. 31, which will be submitted to the shareholders to-morrow (Wednesday), states that the balance of the revenue account for the year, including £12,175 brought forward, is £71,672. After deducting the interim dividends (£19,064) paid in August last, there remains at disposal the sum of £52,608, which the Directors recommend be appropriated as follows: To pay a dividend at the rate of 6 p.ct. per annum for the half year on the preference shares (less income-tax), £1912; to pay a dividend of 1s. 6d. per share on the ordinary shares (free of income-tax), £25,803; to carry to reserve fund, £12,000; to carry forward, £12,892. Owing to the engrossing demands for munitions apparatus, and the continued and growing pressure of war conditions, they have only been able to cope with a small proportion of the orders received in the ordinary gas-stove section of the business. It is, they add, most satisfactory that during past years they have so developed the furnace business and the subsidiary concerns owned by the Company that these last year showed progress upon a scale which has more than counterbalanced the temporary limitation of the domestic apparatus output.

STOCK MARKET REPORT.

An improvement, although of no great magnitude and not strongly marked, in the position of things on the Stock Exchange took place last week. Whatever its proportions, it is a grateful task to have to record any change for the better after a continuous chronicle of inanimate quietude and dull markets. It is noteworthy also to remark that the improved tone grew firmer day by day, and was at its best on Friday—*i.e.*, the day after the initiation of the great German offensive upon the British lines, the prosecution of which was regarded in City circles with calm confidence.

The generally firm tendency was conspicuously apparent in the gilt-edged market; Home Government issues being well to the front. The War Loans made good progress upward, especially the 5 p.ct., which had some amount of lost ground to recover. Consols and other kindred issues also made advances. Home Rails, after a very quiet opening, manifested animation and did fairly well, especially prior charges. In Canadians, Grand Trunk advanced in view of the latest intelligence; but this did not help Canadian Pacific. With increased traffics and diminished alarm in regard to strikes, Argentines improved.

The Foreign Market did pretty well on the whole, though a little patchy in places. At the close, French, Spanish, and Brazilian were among the chief gainers; but Japanese was rather easier. There was some buying of Russian.

Business in the Gas Market showed little improvement over the preceding week in point of the number of bargains accomplished, and even a greater number of companies were left untouched altogether; the great mass of transactions being concentrated in the three largest undertakings. The tendency was variable. Gas Light ordinary was firm, and the quotation advanced a point. South Metropolitan and Commercial were steady and unchanged. The Wandsworth issues, other than the "A" stock, were lowered. Sheffields were quoted *ex div.*, and had a little the better of the change.

In the Money Market, rates both for short loans and for discount were harder.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 53, Commercial 4 p.ct. 68⅜, 69, Gas Light ordinary 63¾, 64, ditto maximum 55⅓, Primitiva 36s., South Metropolitan 64, 64⅛, 65. On Tuesday, Brentford "B" 73, ditto preference 81, Commercial 4 p.ct. 68¼, Gas Light ordinary 63, 63¼, 63⅜, 63⅞, 64, Imperial Continental 86½, 87, ditto debenture 66, 66¼. Primitiva 35s., South Metropolitan 63⅓, 64, 64½. On Wednesday, Alliance and Dublin 52⅝, 52¾, Gas Light ordinary 64, 64¼, Imperial Continental 86⅞, 87, South Metropolitan 64½. On Thursday, Commercial 4 p.ct. 67, ditto 3½ p.ct. 62½, Gas Light ordinary 64⅛, 64¼, 64⅜, 65, 65⅛, ditto preference 69⅞, ditto debenture 55, Imperial Continental 85⅛, 86⅛, 86½, 86¾, 87, Monte Video 8⅛, 8 3/16, Primitiva 35s., 35s. 0d., 36s., ditto preference 55s., South Metropolitan 64, 64¼, 64⅛, 65, ditto debenture 55⅛, Wandsworth "B" 80. On Friday, Commercial 4 p.ct. 67, Gas Light ordinary 64⅛, 65, 65¼, ditto preference 69½, ditto debenture 55⅛, Imperial Continental 86⅛, 86⅞, 87, South Metropolitan 64⅜, 65, 65¼, Wimbledon 82, 82½, Southend 4 p.ct. debenture 59, 59½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55—60	..
1,551,868	"	April 8	2½	4⅜	Alliance & Dublin Ord.	52—54	52—57	52⅝—53
974,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280,000	5	April 29	7½	3/6	Bombay, Ltd.	..	5—5½	5½
60,000	10	Feb. 26	16	13%	Bourne-mouth Gas and Water { 10 p.c.	29—30	22—24	..
883,110	10	"	7	7%	B 7 p.c.	15—15½	10½—10⅝	..
115,000	10	"	6	6/-	Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	—	—	4%	4 p.c. Deb.	..	67—69	..
993,045	Stk.	Feb. 26	14	4⅛%	Brentford A Consolid.	261—266	76—79	..
734,920	"	"	11	4⅛%	Do. B New	204—209	73—76	73
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	79—84	81
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	63—65	..
217,380	"	Feb. 26	11	9%	Brighton & Hove Orig.	208—213	140—145*	..
244,200	"	"	8	6%	Do. A Ord. Stk.	154—159	95—100*	..
530,000	20	Mar. 26	12½	23/6	British	44—45	32—33	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2⅛	3½—3⅝	..
100,000	10	—	—	4⅛%	Do. 4½ p.c. Pref.	4—6	7—8	..
100,000	Stk.	June 26	4½	4⅛%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,513,280	"	Feb. 12	5/9/4	41/4	Commercial 4 p.c. Stk.	106—108	67—69	67—69
560,000	"	"	5⅛	36/8	Do. 3⅝ p.c. do.	103—105	62—64	62½
475,000	"	June 11	3	3⅝%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	38—40	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	60—63	..
278,400	—	—	—	11⅛%	Croydon B and C 7 p.c.	..	155—165	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	8½—9½	..
16,298,975	Stk.	Feb. 10	4/17/4	37/4	Gas { 4 p.c. Ord.	98—102	64—66	63—65½
2,600,000	"	"	3½	3⅛%	Light { 3½ p.c. max.	76—79	55—57	55½
4,062,235	"	"	4	4%	and { 4 p.c. Con. Pref.	96—99	69—71	69½—69⅞
4,674,350	"	June 11	3	3%	Coke { 3 p.c. Con. Deb.	72½—74½	55—57	55—55½
130,000	"	"	10	10%	10 p.c. Bonds	..	..	..
258,740	"	Mar. 12	5	3⅛%	Hastings & St. L. 3½ p.c.	87—89	46—51*	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7⅞—8¼	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	115—125	..
181,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	90—95*	..
65,780	"	"	6⅜	5⅝%	Do. B	115—118	70—75*	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	63—66	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	86—88	85½—87
1,285,000	"	Feb. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	65—67	66—66½
285,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87*	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	82—84	..
					{ B	146—148		
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅝—3¾	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	89—100	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8¼—8 3/16
1,875,892	Stk.	July 29	4½	3⅛%	Newcastle&Gatsh'dCon.	96½—99½	73—74	..
529,705	"	June 26	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	60—62	..
55,940	10	Feb. 26	7/14/0	7/0	North Middlesex 7 p.c.	14—15	9½—10½*	..
900,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	10%	Portsea, Island B	128—131	82—87	..
100,000	50	"	12	9%	Do. C	118—121	72—77	..
52,000	50	"	10	7%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1½—2	35/—36/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2½—3	55/-
531,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—78	..
—	—	—	—	4%	Do. " " 1911	..	..	..
946,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	57—62	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	293—294	174—177*	..
909,984	"	"	10	10%	Do. B	292—294		..
528,500	"	"	10	10%	Do. C	290—293		..
90,000	10	May 28	9	6/-	South African	10½—11½	9—10	..
6,009,895	Stk.	Feb. 10	5/4/0	40/-	South Met. 4 p.c. Ord.	111—113	64—66	63½—65½
—	—	—	—	—	Do. Pref.	..	93—95	..
1,895,445	"	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	54—56	55½
234,820	"	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	134—136	..
962,795	"	"	6	4⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	73—75	..
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	73—75	..
135,000	—	—	—	4⅛%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	84—86	..
647,740	"	May 14	5	5%	Southampton Ord.	99—102	75—77	..
120,000	"	Feb. 12	7½	5⅛%	Tottenham { A 5 p.c.	135—138	90—95	..
782,275	"	"	6	4%	District { B 3½ p.c.	115—117	68—70	..
181,255	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	61—63	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	87½—88½*	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅜	67/6	Wandsworth A 5 p.c.	151—156	108—113	..
256,636	"	"	6¾	52/6	Do. B 3½ p.c.	129—134	80—85	80
108,075	"	"	5/17/8	47/3	Do. C 3½ p.c.	116—115	80—85	..
252,000	"	"	6¼	46 3	Wimbledon 5 p.c.	117—122	80—85	82—82½
98,000	"	"	6⅔	52/6	Epsom 5 p.c.	121—126	80—85	..
88,416	"	June 26	3	5%	3 p.c. Deb. Stk.	66—69	49—52	..

* Ex Div.

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLI. No. 2863.] LONDON, MARCH 26, 1918. [70TH YEAR. PRICE 6d.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams—"DARWINIAN, MANCHESTER." Telephone—3268 & 3269 City (two lines).

'BUFFALO' INJECTOR

Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams: "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C. 4.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1¼in. to 12in. BORE.
THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.
Telegrams: "BONLEA, THORNABY-ON-TEES."

CARLESS, CAPEL & LEONARD,
HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.
And at PHAROS WORKS, HACKNEY WICK.
NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,
Specially distil Carburine Spirit, Specific gravity ·680, or of any other grade suitable for Enriching Gas, also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.
Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthalene, &c.
Samples and Prices may be had on application.

WRITE FOR PARTICULARS.

BLAIR, CAMPBELL & McLEAN LTD.
GOVAN, GLASGOW.

Centrifugal Scrubbers
(McLAURIN PATENT).
Revolutionises existing methods of Benzol, Ammonia, and Cyanogen Recovery.
Recovery Efficiency, 95-100 per cent.
QUICK DELIVERY.
Orders on hand include Scrubbers for Benzol Recovery.
BENZOL RECOVERY STILLS
embodying Latest Designs. Enquiries Solicited.
Telegrams: "Blazon, Glasgow."

CHAMBER CARBONIZATION

WITH

KOPPERS' CHAMBER OVENS

IS THE MOST EFFICIENT

AND MOST ECONOMICAL SYSTEM OF

GAS PRODUCTION.

KOPPERS' PROCESS

OF

DIRECT RECOVERY OF AMMONIA FOR GAS-WORKS.

In this system the scrubbing process is entirely dispensed with, and the Ammonia is recovered direct from the Gas in the form of Sulphate.

ADVANTAGES OF KOPPERS' DIRECT RECOVERY PROCESS.

INCREASED YIELD OF SULPHATE.
GREAT SAVING IN STEAM CONSUMPTION.
REDUCTION IN WATER CONSUMPTION.
PLANT IS SIMPLE TO OPERATE.
EFFLUENT LIQUOR REDUCED TO A MINIMUM.
EXCELLENT QUALITY OF SULPHATE PRODUCED.

FULL PARTICULARS ON APPLICATION TO THE

KOPPERS' COKE OVEN & BYE-PRODUCT CO.,

301, GLOSSOP ROAD, SHEFFIELD.

Telephone: No. 1331 (two lines). Telegrams: "KOCHS SHEFFIELD."

"HOBSIL"

INSULATING BRICKS

9 in. × 4½ in. × 2 in.

Fusion Point - approx 3000 Fahr.

FOR

Gas Retorts, Ovens, &c.

HOBDELL, WAY, & CO., LTD.,

TELEGRAMS—"HOBNAILS."
TELEPHONES—AVENUE 3810 (3 lines).

124-7, Minories, LONDON, E.1.

Victor Blagden & Co.

4, LLOYD'S AVENUE,

Buyers of all **LONDON, E.C. 3.**

TAR PRODUCTS

AMMONIA PRODUCTS

SULPHATE
MURIATE
NITRATE
CARBONATE

PITCH
BENZOL
CREOSOTE
TOLUOLE
CARBOLIC ACID
SOLVENT NAPHTHA
PYRIDINE
NAPHTHALENES
CRESYLIC ACID
ETC.

CYANOGEN PRODUCTS

PRUSSIATE POTASH
PRUSSIATE SODA
PRUSSIATE CALCIUM
CYANIDE OF POTASSIUM
CYANIDE OF SODA

Telegraphic Address: "BLAGDENITE, FEN, LONDON."

ARROL-FOULIS

Stoking Machinery

HYDRAULIC COKE PUSHERS

(HUNTER and BARNETT'S PATENT.)

WILL DISCHARGE A RETORT IN ONE OPERATION

LARGE NUMBERS IN USE.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

LONDON ADDRESS: 56, VICTORIA STREET, S.W.

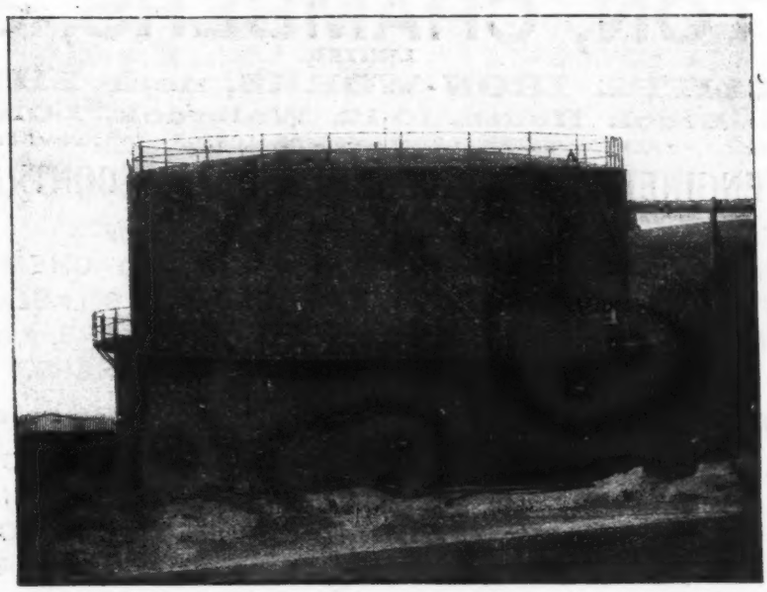
(See Advertisement, March 12, p. 522.)

THOMAS PIGGOTT & CO., Ltd.,

Atlas Works, BIRMINGHAM.

IRON CASTINGS FOR ALL PURPOSES.

Gasholders of any capacity with or without Guide Framing and Steel Tanks.



Acid Plants.

Boiler Flues.

Steel Chimneys.

Barker's Patent Open Spiral Guided Gasholder as erected at the Gas-Works, Haverfordwest.

ENQUIRIES INVITED FOR GAS-MAKING PLANT.

Telegrams—"Atlas, Birmingham."
"Intersection Cent. London."

Telephone—3922 Cent. Birmingham (4 lines).
8752 City London.

GOODALL, CLAYTON, & CO., Ltd., WORKS: LEEDS.

Builders of Complete Installations of—

INCLINED AND HORIZONTAL RETORT BENCHES, COAL AND COKE HANDLING PLANTS, CONVEYORS, ELEVATORS, ROOFS, BUNKERS, COAL BREAKERS, HOISTS, &c.

Licensees of The Vertical Gas Retort Syndicate, Ltd., London, for complete

INTERMITTENT VERTICAL RETORT INSTALLATIONS.

HARDMAN & HOLDEN, LTD., MANCHESTER.

Telegraphic Addresses:
"Benzole, Manchester."
"Benzole, Blackburn."
"Oxide, Manchester."

Telephones:
Manchester—Miles Platting and Clayton | City 8666 (3 lines). Oxide, 2369 City Manchester. Blackburn, 6295 Blackburn.

All Bye-Products from the Distillation of Coal dealt with.

SPECIALITIES Hydrated Oxide of Iron for Gas Purification, and of different Strengths to suit conditions of Purification Sulphuric Acid (free from Arsenic) for Sulphate of Ammonia Manufacture, Recovered Sulphur, and Prussiates of Soda, Spent Oxide bought on Sulphur and Cyanide Contents, Tar and Gas Liquor purchased. *See our Advertisement last week.*

Workmanship and Materials of the Highest Quality.

PECKETT'S LOCOMOTIVES.

Built to any Specification or Gauge.

PECKETT & SONS, LTD.,
ATLAS LOCOMOTIVE WORKS, BRISTOL.

NEWTON, CHAMBERS, & CO.,

LIMITED.

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

LONDON OFFICE: **Brook House, 10-12, Walbrook, LONDON, E.C.**

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON." *National Telephone No.* 2200.

GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

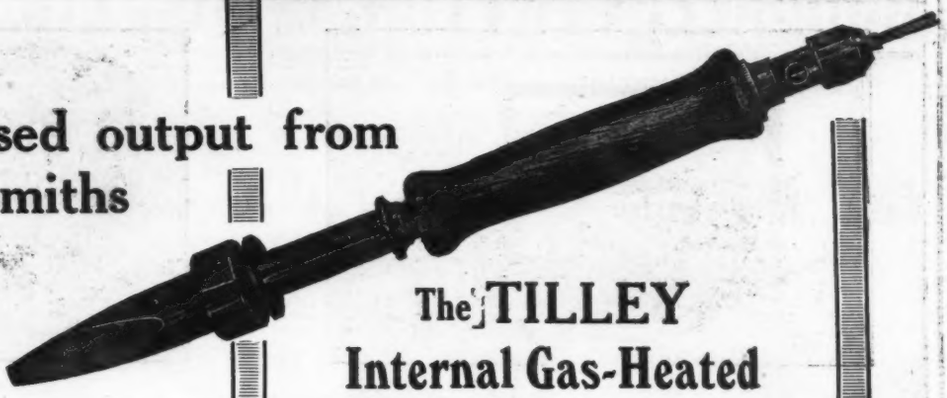
PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (special quality) for Engine Cylinders. GAS COAL famous for its Unrivalled excellence.

Established 1792.

Increased output from Tinsmiths



The TILLEY Internal Gas-Heated SOLDERING BOLT

All the gas consumed by the TILLEY Bolt is employed usefully. For repetition work especially this bolt is a *great* improvement on the externally-heated iron, and far more economical and comfortable to use. There is no stopping to retin or reheat. The working point is maintained at the right temperature; and the handle always remains cool.

Ask us to send a TILLEY Bolt for you to try, and write for Trade List.

Connection is made to any H.P. gas supply by means of flexible tubing.

The TILLEY HIGH PRESSURE GAS SYNDICATE, LTD.
53, Kingsland Road, LONDON, E. 2.

E.I.H.

THE
Stanton Ironworks Company, LTD.,
Near NOTTINGHAM.

STANTON
Cast Iron Pipes

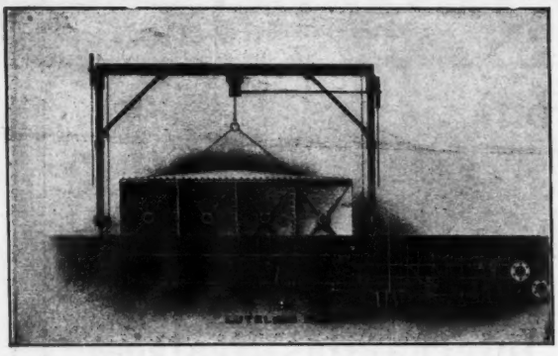
Employees Total 7000.

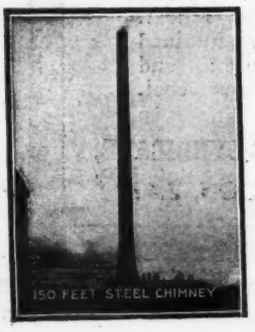
London Office:
Maxwell House, Arundel Street, Strand, W.C. 2.

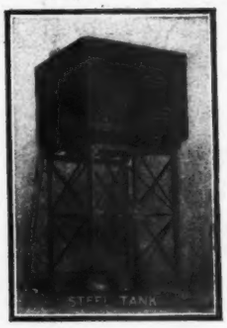
Ironmasters and Colliery Proprietors

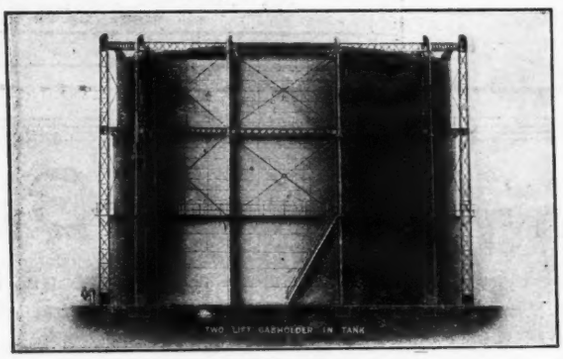
SUPPLIERS OF

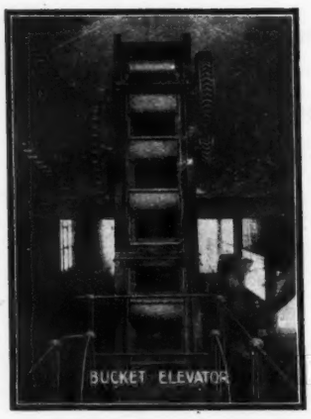
BASIC AND FOUNDRY PIG IRON.
CAST-IRON PIPES AND SPECIALS.
CAST-IRON SUBWAY SEGMENTS.
CAST-IRON TANKS, COLUMNS, GIRDERS, WELL CYLINDERS.
SLAG FOR ROAD MAKING. TAR MACADAM.

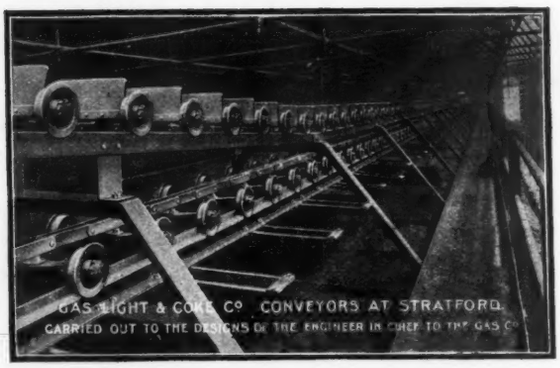












Head, Wrightson, & Co., Ltd.,
STOCKTON-ON-TEES.

Everything in Gas Lighting Material

Veritas Mantles, Glassware, Pendants and Brackets, Small Brass Fittings, Ukay Inverted Lanterns, &c., &c.

ALL BRITISH MADE.

FALK, STADELMANN & CO. LTD.

LONDON - GLASGOW - MANCHESTER

COMPTOIR COMMERCIAL
de PRODUITS CHIMIQUES
97, Rue Saint-Lazare, PARIS IXé

Telegrams - - "Comchimic-Paris."

IMPORTERS OF

HEAVY TAR PRODUCTS

Correspondence solicited.

RETORT SETTINGS

WILSON'S (CONT-INT.) **VERTICALS**

HISLOP'S **HORIZONTALS**

RENEWALS & NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

R. & G. HISLOP
Underwood House,
PAISLEY

LINDSAY LIGHT COMPANY,
CHICAGO.

THORIUM & CERIUM NITRATES.

72, MARK LANE,
LONDON, E.C. 3.

TO OUR CUSTOMERS,

In view of the difficulties appertaining to shipping space from the U.S.A. we request the favour of your immediate consideration of your requirements for 1918.

The placing of your orders *NOW* will assist our principals to cope with the situation in their endeavour to prevent dislocation of business through non-arrival of supplies.

Yours faithfully,

PAUL WINN & CO., LTD.
(Sole Agents for Europe).

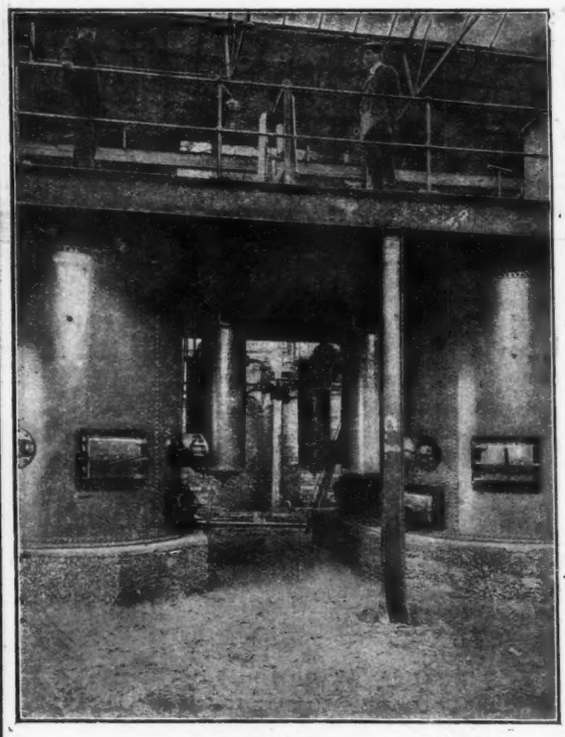
WATER-GAS PLANTS

BLUE OR CARBURETTED

(K. & A. and Smith's Patent.)

Features—

1. Simplicity of operation.
2. Convenience of working to meet sudden fluctuations of demand.
3. Low fuel consumption.
4. Minimum maintenance expense.
5. Efficient gas production of constant quality and low CO_2 content.



Designs, Estimates, and full Particulars on application:

PERRY & Co. (BOW), LTD.,

Engineers and Contractors,

56, Victoria Street, S.W.

'Phone—2960 Victoria.
8382 "

"GRAETZIN"
is now BRITISH

Having been purchased from H.M. Government

BY

HERBERT & JAMES STEVENSON, Ltd.

GAS LAMPS

and ACCESSORIES.

16, Water Lane, LONDON, E.C.

TELEPHONE: 4932 AVENUE.

THE "CHAPTER" LOW PRESSURE LAMP.

ALL LAMPS ARE NOW BRITISH MADE THROUGHOUT.

THE BEST IS THE CHEAPEST.

Large Stocks on hand.

CUSTOMERS COME AGAIN

and again for

Bonbac Gas Mantles

THE PREMIER RAMIE MANTLE

Introduced in 1900

and still holds its own against all other makes.

BRITISH MADE

Sold at Popular Prices and a good Profit to Retailers.

BURNERS, GLASSWARE, and ACCESSORIES AT COMPETITIVE PRICES.

WHOLESALE FITTINGS Co., Ld.

LONDON: 23/27 Commercial St., E. 1.

MANCHESTER: 41 Shudehill.

CONTENTS.

EDITORIAL NOTES.

The Board of Trade and the "Financial Hardships" Bills 577
Coal Supplies Reduction and Gas Rationing . 577
The Tyranny of the Times 578
A Sulphuric Acid Makers' Association . . 579
The Oil Position—Corrosion of Refractory Materials 579
Coal and Coke Exports 580

Personal 580
Gas-Workers' Wages Demands 580
Coalite History in Brief 580
Electricity Supply Memoranda 581
Wright's "Autogas" Producer 583
Sixty Years Ago 583
Gas Companies and Income-Tax. By George Rogerson 584
Recent Development in the Gas Industry. Mr. Cotton's Dublin Lecture 585
A Gas-Coke-Producer-Fired Tank-Furnace for the Production of White Glass. By A. B. Roxburgh 586
Alloa Corporation Gas and Electricity Works 587
The Coke-Oven Managers' Association (Western Section) 588
Coke-Oven Managers' Association (Midland Section). Lecture by Prof. W. Fearnsides 589

REGISTER OF PATENTS.

Helical Metal Tubes or Pipe Lines—Murphy, S. J. 591
Apparatus for Storing and Utilizing Energy—Anderson, D., and Scott-Snell, C. . . . 591
Gas Burners for Furnaces—Fletcher, Russell, & Co., Ltd., Fletcher, T. W., and Singleton, J. H. 591
Producing Combustible Fuel—Rose, J. R. . 591
Metal Heating Furnaces—Richmond Gas Stove and Meter Company, Ltd., and Thompson, J. 591
Applications for Patents 592

PARLIAMENTARY INTELLIGENCE.

Earlier Closing Order 592
Lighting, &c., Restrictions 592
Employment of Lascars in Gas-Works . . 592
The "Financial Hardships" Bills—Consumption of Gas and Electricity to be Curtailed 593

MISCELLANEOUS NEWS.

Opposition to London Gas Bills 594
Gas for Motor Vehicles 594
Proposed National Sulphuric Acid Association 595
Current Sales of Gas Products 597
Stock Market Report 600

CORRESPONDENCE.

Gas Light and Coke Company's Co-Partnership Scheme 591
The Reading Gas Company and the Aldershot Gas Bill 591

PARAGRAPHS.

Modern Developments in Gas-Works Construction and Practice—The British Engineers' Association 581
Masonic—Murdoch Lodge, No. 3480—Restrictions in the Use of Gas and Electricity—Atmospheric Pollution 582
Increased Output of Natural Gas—Proposed Association for Refractories Research . . 583
Illuminating Engineering 584
Gas for Making Silk Substitutes—Midland Association of Gas Engineers and Managers—Informal Meeting of Scottish Gas Managers 588
Low-Pressure Hot-Water Systems—Brass Melting by Gas—Thawing Gas-Mains by Electricity 590
Irish Gas Prices — Burnley Gas-Works Finances—Torquay Gas Company . . . 592
Gas Manager's Conditional Exemption—The Glasgow Gas-Furnace Rooms—Obscuring Lights—Glasgow and Gas Restrictions—Gas Charges at Morecambe 598
Dearer Gas Forecasted in Edinburgh—Darwen Gas Prices Increased—Advance in Price at Silsden—Increase in Price at Staveley—Communal Kitchens 599
Price of Gas at Burnley—Higher Gas Rates at Coatbridge — Increase in Price at Monifieth 600

"JOURNAL" OFFICE TELEPHONE.

The "Journal" Office Telephone Number is "6857 Holborn."

HUMPHREYS & GLASGOW, LTD.,

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

WATER GAS

BLUE *AND* CARBURETTED.

Humphreys & Glasgow, Ltd. **354,200,000** Cubic Feet Daily.

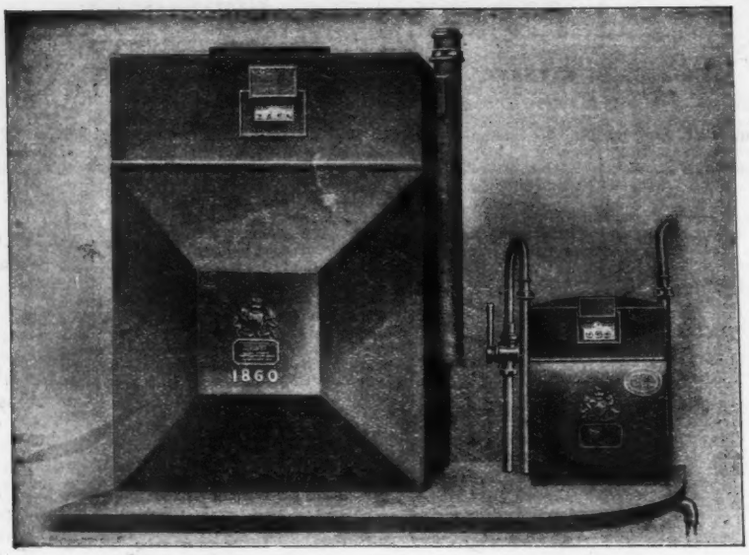
The U.G.I.Co., U.S.A. - - **750,900,000** Cubic Feet Daily.

OVER ONE THOUSAND MILLIONS CUBIC FEET DAILY.

38, VICTORIA STREET, LONDON, S.W.

Bureau de Bruxelles: 209, Chaussée D'Ixelles.

A RECORD.



100 lt. Meter fixed and in continuous use since 1860.

10 lt. Meter fixed and in continuous use since 1861.

DRY GAS METERS.

Since 1844 when we patented and commenced making Dry Meters we have made **and sold** nearly Two Millions of Dry Gas Meters.

We meet many of our early patterns after nearly Three Score Years of accurate work.

Were proof required of the widely known reliability of the **Thomas Glover** Meters, here is one of many.

Let us know of your requirements, and we will give you the best deliveries.

THOMAS GLOVER & CO., Ltd.

(Original Makers—Established 1844),

GOTHIC WORKS, ANGEL RD., EDMONTON, LONDON, N.18.

London Show-Rooms: 25, PRINCES STREET, OXFORD CIRCUS, W.1.

King Edward Road, BIRMINGHAM; 18, Severn Street, Deansgate, MANCHESTER; Gothic Ironworks, FALKIRK; 82, Gordon Street, GLASGOW; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY.

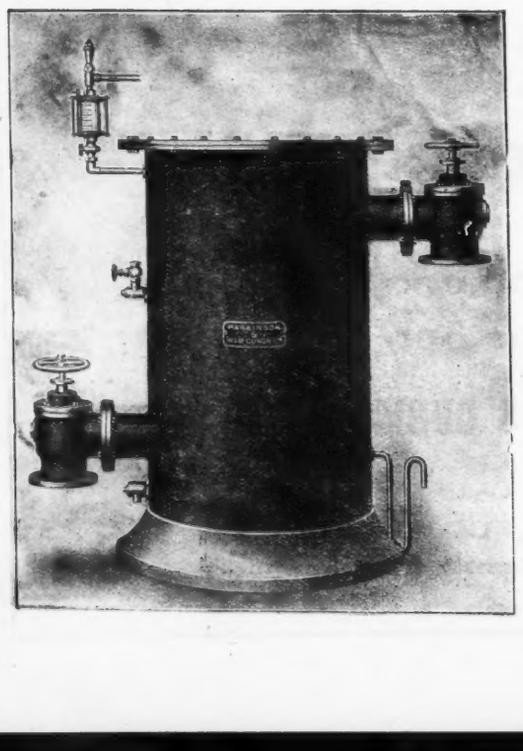
Naphthalene Trouble

IS EASILY OVERCOME

BY INSTALLING

A

Petroleum Vapouriser.



FULL PARTICULARS FROM

W. PARKINSON & CO.,

(INCORPORATED IN PARKINSON AND W. & B. COWAN, LTD.)

COTTAGE LANE, CITY ROAD, LONDON.	BELLBARN ROAD, BIRMINGHAM.	HILL STREET, BELFAST.
Telegrams: "INDEX, LONDON." *Telephone Nos.:* 7570 CITY.	"GASMETERS, B'HAM." 2245 MIDLAND, B'HAM."	"PREPAYMENT, BELFAST." 3374 BELFAST.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ASSISTANT ENGINEER. Winchester Water and Gas Company.
WORKING MANAGER. Larne Gas Company. Applications by April 10.
FOREMAN. No. 6431.
FOREMAN FIREMAN. No. 6432.
GAS FITTER. Morecambe Gas Department.

Appointments, &c., Wanted.

COKE-OVEN MANAGER. No. 6433.
MANAGER OR MANAGER AND SECRETARY. No. 6389.

Plant (Second-Hand) for Sale.

GASHOLDER COLUMNS. Reigate Gas-Works.
SATURATOR. Yorkshire Semet-Solvay Company, Sheffield.

Plant, &c. (Second-Hand) Wanted.

GASHOLDER (200 to 300 ft.). Swan, Hunter, and Wigham Richardson, Ltd., Wallsend-on-Tyne.
HYDRAULIC MAINS AND STATION METER. No. 6430.
WATER GAS PLANT. No. 6425.

TENDERS FOR

Coal.

LOUTH GAS COMPANY. Tenders by April 5.
YEOVIL GAS DEPARTMENT.

Retort Setting (Material and Labour).

HAVERHILL GAS DEPARTMENT. Tenders by April 10.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

EASTER HOLIDAYS.

It is proposed to issue the "JOURNAL" a day later next week—on Wednesday rather than Tuesday.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 23s. 6d.; Half Year, 12s.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, an extra charge of 4s. a year is made.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.
In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Feb. 19, p. 371.

MEWBURN, ELLIS, AND PRYOR.

CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bogore. 85 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams—"SATURATORS BOLTON." Telephone 0848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & Co., Ltd.,
92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
39, VICTORIA STREET, WESTMINSTER, S.W. 1.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphths, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

WORKS Manager of a Gas Company, (Output 60 Million c.ft.), with Charge of Distribution, REQUIRES SIMILAR POSITION, or one as MANAGER and SECRETARY. Age 42. Seventeen Years' Experience. Good Business Abilities, Engineering Knowledge, and Excellent References.
Address No. 6389, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

OXIDE OF IRON.
SPENT OXIDE WANTED.

BALE & CHURCH, LTD.
83, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.
83, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.
83, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

COKE-OVEN Manager, now in Charge of large Installation, desires CHANGE. Experienced Waste Heat and Regenerative Ovens, Ammonia, Sulphuric Acid, Benzol Rectification, and Tar Distillation. Over Ten Years present Position. Ineligible for Army.
Address No. 6433, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

THE Larne Gas Company, Ltd., Larne (co. Antrim), require a thoroughly Practical man as WORKING MANAGER of their works. Must be a good Carbonizer, able to read Meters, and have Experience in working on the Regeneration System, and in the making of Sulphate of Ammonia.
Annual make of Gas, 20,000,000 c.ft.
State where last employed and Salary expected.
Applications, with *copies* of Testimonials, to be received not later than April 10, and be addressed to
ALEX. ERSKINE,
Secretary.
Waterloo, Larne,
March 12, 1918.

WINCHESTER WATER AND GAS COMPANY.

ASSISTANT ENGINEER REQUIRED.
Apply, giving full Particulars—Age, Education, Technical Training, &c., and References—to H. C. HEAD, Engineer and General Manager, 19, Staple Garden, WINCHESTER.

FOREMAN Fireman required for Midlands, preferably with Experience in Firing Producer Gas Furnaces.
Apply, by letter, giving full Particulars of Experience, Age, and Wages required, to No. 6432, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FOREMAN Wanted, in South Midlands, used to Water Gas. Good Wages.
Apply, by letter, stating full Particulars and when Disengaged, to No. 6431, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

MORECAMBE CORPORATION.
(GAS DEPARTMENT.)

WANTED—a Gas-Fitter.
State Wages required and Experience to R. HY. RUTHVEN, Engineer and Manager, Gas-Works, MORECAMBE.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONISING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, Rose Mount Ironworks, Elland.

WATER-GAS Plant Wanted (Second-Hand) in Good Order, of a Capacity of 200,000 Cubic Feet per day.
State Maker, Age, and Condition, to No. 6425, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, immediately, a small Bell GASHOLDER of from 200 to 300 ft. capacity. Particulars to Chemical Laboratory, Swan, Hunter, & Wigham Richardson, Ltd., Wallsend-on-Tyne.

WANTED—Eight Hydraulic Mains, about 8 ft. 6 in. long; also STATION METER, 60,000 or 80,000 c. ft. per hour.
Address, No. 6430, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

SATURATOR for Sale—Cast-Iron Casing, 5 ft. 6 in. diameter by 5 ft. deep, Walker's Self Discharging, Lined ¾ in. Lead. Complete with Discharge Valve, Supporting Columns, and Draining Table. Not been used.
Yorkshire Semet-Solvay Company, Ltd., 155, Norfolk Street, Sheffield.

FOR SALE—Ten Cast-Iron Gasholder COLUMNS, with Base-Plates and Girders Complete for Erection.
Four 13 ft. 6 in. by 7 in. to 6 in. Tapered.
Six 16 ft. 9 in. to 7½ in. Tapered.
To be seen at the Gas-Works Reigate. Apply to G. Mead-Robins, Engineer.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Co., Ltd., Church Fenton, near Leeds.

YEOVIL CORPORATION.
(Gas Department.)

THE above Gas Department are prepared to receive TENDERS for the Supply of Screened GAS COAL and NUTS over the Twelve Months commencing July 1, 1918.
Tenders, endorsed "Tender for Gas Coal," to be sent to the undersigned.
Geo. Fenwick,
Engineer and Manager.
Gas-Works,
Yeovil.

HAVERHILL URBAN DISTRICT COUNCIL.
(Gas Department.)

TENDERS FOR RETORT SETTING.

THE Gas Committee of the above Council invite TENDERS for the RE-SETTING of a Bed of Six single RETORTS at the Gas-Works, Haverhill, including the SUPPLY of all MATERIALS and LABOUR.
Specifications of the Work to be done and any other Particulars may be obtained on Application to Mr. H. Banyard, the Gas-Works Manager.
The Council do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Retort Setting," to be Delivered to me on or before the 10th day of April, 1918.
James Beasley,
Clerk to the Council.
Haverhill, Suffolk,
March 25, 1918.

THE Directors of the Louth Gas Light Company invite TENDERS for the Supply of South Yorkshire Screened GAS COAL.
Further Particulars may be obtained on Application to Leonard Birchmore, Manager, Gas-Works, Louth.
Tenders, endorsed "Tenders for Coal," to be sent to the undersigned not later than Friday, April 5, 1918.
Philip Allison,
Secretary.
Gas-Works,
Louth, Lincs.,
March 18, 1918.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 37, Walbrook, E.C.

TROTTER, HAINES, & CORBETT, LIMITED.
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
Shipments Promptly and Carefully Executed.
London Office: E. C. Brown & Co., Leadenhall Chambers, 4, St. Mary Axe, E.C.

R. LAIDLAW & SON (EDIN.) LTD
GAS METER MAKERS.
ORDINARY & PREPAYMENT METERS
Repairs and Conversion of Ordinary to Prepayment Meters receive prompt attention.
LONDON & EDINBURGH.

CARBURINE FOR GAS ENRICHING
Also
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to —
The GAS LIGHTING IMPROVEMENT CO., Ltd.,
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4451, 4452, 4453, and 4454 London Wall.
Telegraphic Address: "Carburine, London."

HIGH-PRESSURE DISTRIBUTION
GAS DISTRIBUTION LIMITED
(Late HELM LAMP COMPANY)
can supply
Everything except the Gas.
WELDED JOINTS ARE OUR SPECIALITY.
Queen's Buildings, NUNEATON

JOHN HALL & CO. OF STOURBRIDGE LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

TELEPHOS
NO BY-PASS
COMPLETE SETS
FROM 11/6 SUBJECT.
NEW 1914 MODELS
Apply for New Catalogue to:—
"TELEPHOS"
16/20, Farringdon Avenue, E.C.
BRITISH MADE.
GAS SWITCH

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

JOHN BROWN & CO., LTD., SHEFFIELD
OWNERS OF THE FAMOUS
ALDWARKE & ROTHERHAM MAIN GAS COAL
As used by the principal Gas Companies of the World.
VERY FREE FROM IMPURITIES.
TELEGRAMS: "ATLAS, SHEFFIELD."

W. J. JENKINS & CO., LTD.,
RETFORD.

See Advertisement last week.

GAS COAL AND CANNEL.

WILSON CARTER & PEARSON,
LIMITED,
Gas, Steam, and other Fuel for Home and Export,
GAS COKE CONTRACTORS.

Chief Offices: 20A, TEMPLE STREET, BIRMINGHAM.
Telegraphic Address— "CARTER PEARSON, BIRMINGHAM." Telephone Nos.— CENTRAL 2013 and 2014.

Special Pressure and Pressure & Exhaust Registers.

For RETORT-HOUSE GOVERNORS.
For EXHAUSTER HOUSES.
For OFFICES & DISTRICTS.

Fullest particulars on application to—
T. G. MARSH,
28, Deansgate, MANCHESTER.

SULPHURIC ACID FOR SULPHATE OF AMMONIA.

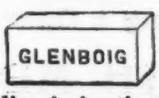
J. BROWN & CO., LTD.,
Savile Town,
DEWSBURY.

THE GLENBOIG UNION FIRE-CLAY CO., LTD.

Manufacturers of the highest grade of Refractory Fire Bricks, specially suited for furnaces subjected to the highest heats and sudden changes of temperature.

All Glenboig Goods are stamped with either "Glenboig" or "Star Works, Glenboig" Brands as under—

REGISTERED

TRADE 

MARKS.

The Two Glenboig Brands are identical in quality, and are used indiscriminatingly in the execution of orders.

GAS RETORTS HORIZONTAL, INCLINED, & VERTICAL RETORTS to New Standard Specification.
Special Bricks and Blocks for all modern Gas Settings.

Telegraphic Address
"GLENBOIG, GLASGOW."

Glasgow Telephones
Post Office 2120; National 3009.

Coatbridge Telephone
National 25.

58 FIRST AWARDS
At International and Home Exhibitions,
including
Grand Prize at Brussels, 1910.
In every case the Highest Award given for Fire Clay Goods.

Contractors to His Majesty's Home and Indian Governments, and the principal National Arsenals of Europe.
On the Admiralty and War Office Lists.

Works: GLENBOIG, GARTCOSH, and CUMBERNAULD.
Head Offices: 48, WEST REGENT STREET, GLASGOW.

HIGH PRESSURE GAS PLANTS

BOOSTING FANS, ROTARY & RECIPROCATING COMPRESSORS,
DISTRICT & SERVICE GOVERNORS.

GEO. WALLER & SON, LTD., Phœnix Iron-Works, STROUD, GLOS.

JOSEPH EVANS & SONS, (WOLVERHAMPTON) LTD.

CULWELL WORKS, WOLVERHAMPTON.

London Address: Salisbury House, London Wall, London, E.C.
Telegrams: "Evans, Wolverhampton."
National Telephone No. 30.

Please apply for Catalogue No. 8.

TRADE MARK.

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 808. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

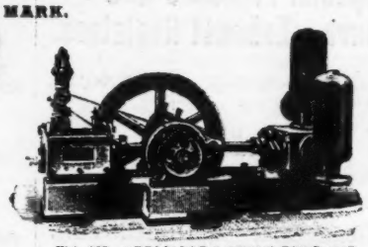


Fig. 665. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

COAL TAR AND AMMONIA PRODUCTS.

Benzole, Toluole, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Beta Naphthol, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia containing a Guaranteed Minimum of 25 per cent. Ammonia.

For Prices apply to the SOUTH METROPOLITAN GAS COMPANY,
709, Old Kent Road, LONDON, S.E. 15.

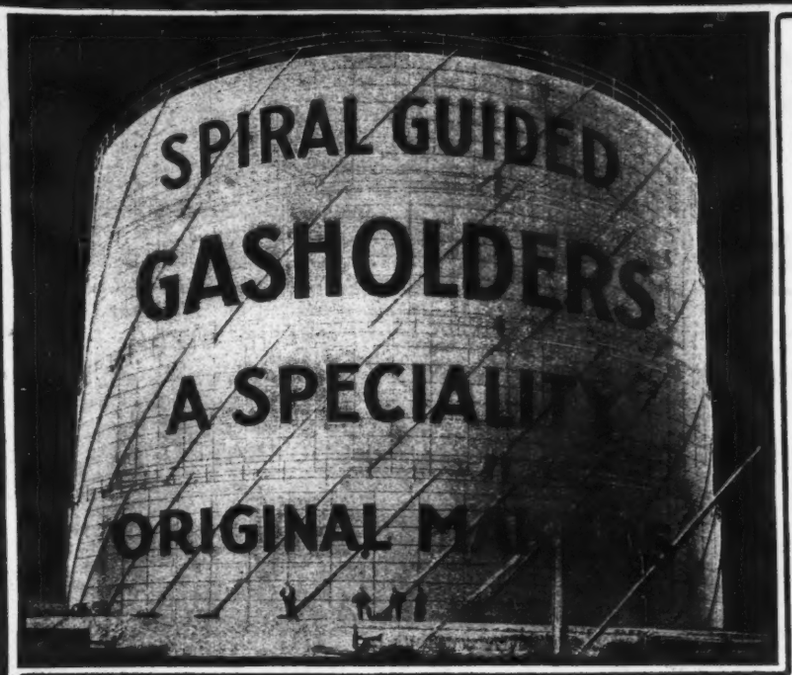
Telegraphic Address
Inland: "Metrogas, Peck. London."
Foreign: "Metrogas, London."

GAS RETORTS AND FIRECLAY GOODS.

"B.B."

BEST BRITISH.

MOBBERLEY & PERRY LTD
STOURBRIDGE.



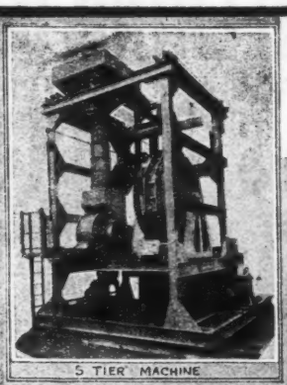
SPIRAL HOLDERS.

WHEN CONTEMPLATING EXTENSIONS PLEASE ALLOW US TO FURNISH PARTICULARS OF OUR SPECIALITIES

GASHOLDERS AND TANKS OF ANY SIZE AND DESIGN

CLAYTON, SON & Co., Ltd., MOOR END HUNSLET, LEEDS

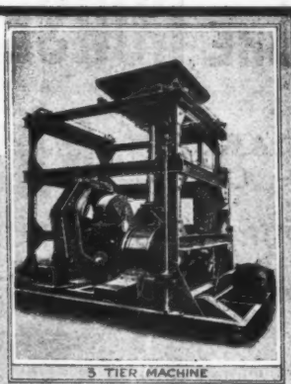
LONDON OFFICE, 60 QUEEN VICTORIA ST., E.C.


5 TIER MACHINE

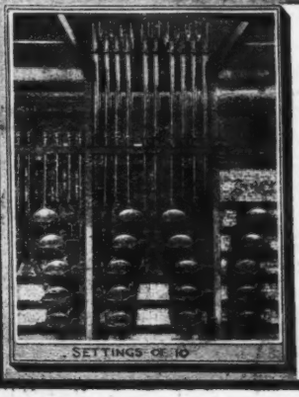
DRAKES LIMITED,
HALIFAX, ENGLAND.

DRAKES LIMITED
IDEAL

Telegrams: "DRAKETED, HALIFAX." Tel.: 543 (3 lines).


5 TIER MACHINE

SPECIALITIES

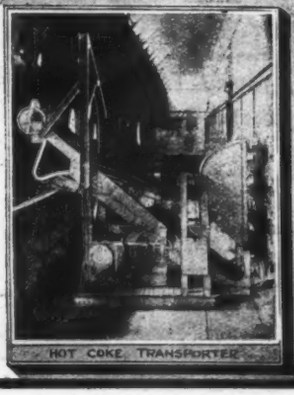

SETTINGS OF 10

We commend for your consideration a combination of our

STOKING MACHINE,
FURNACES AND SETTINGS,
AND
HOT COKE
TRANSPORTER.

IT SOLVES HOT COKE AND LABOUR PROBLEMS.

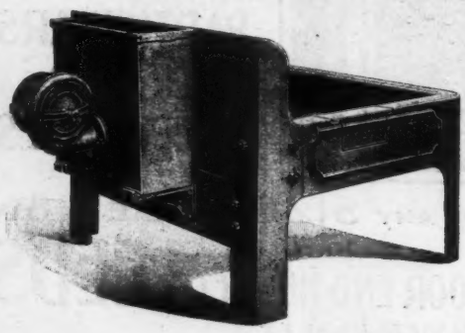
REDUCES COSTS.
IMPROVES RESULTS.
INCREASES RETURNS.


HOT COKE TRANSPORTER

Smiths' Hearths & Fans.

FORGES CONSTRUCTED IN ALL TYPES AND SIZES TO SUIT REQUIREMENTS.

FORGE FANS FOR SUPPLYING THE BLAST TO HEARTHS IN GROUPS OR UNITS AS ILLUSTRATED.



K-B Smithy Plants increase production and promote efficiency.

SCHEMES PREPARED.

James Keith & Blackman Co., Ld.

27, Farringdon Avenue,

LONDON, E.C. 4.

The HORSELEY BRIDGE & ENGINEERING Co., LTD.,

TIPTON, STAFFORDSHIRE.

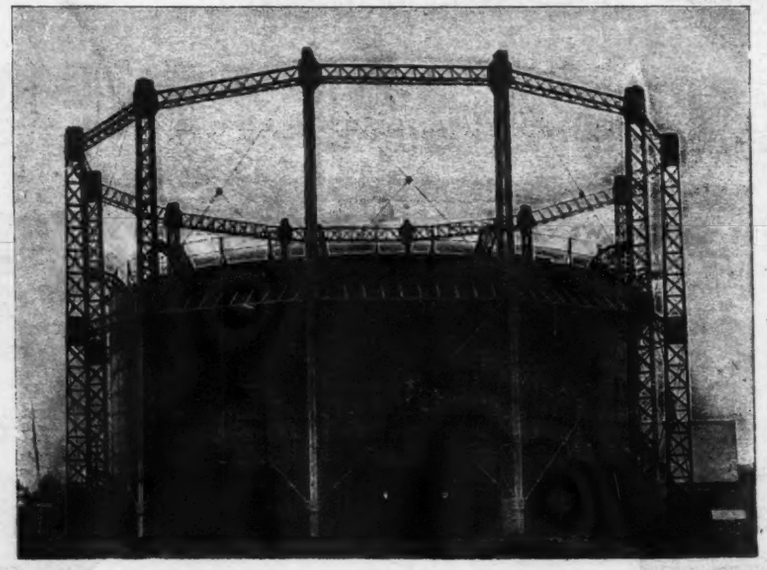
MAKERS — OF — **GASHOLDERS & GAS PLANT.**

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, CAST-IRON AND STEEL TANKS, PRESSED STEEL FLOORING, Etc.

Works & Head Office:
TIPTON,
STAFFORDSHIRE.

London Office:
11. VICTORIA STREET,
WESTMINSTER.

Telegraphic Addresses:
"HORSELEY, TIPTON."
"GALILEO, LONDON."



Also all Kinds of

STRUCTURAL IRON AND STEEL WORK.

BRIDGES,

ROOFS,

PIERS, Etc.

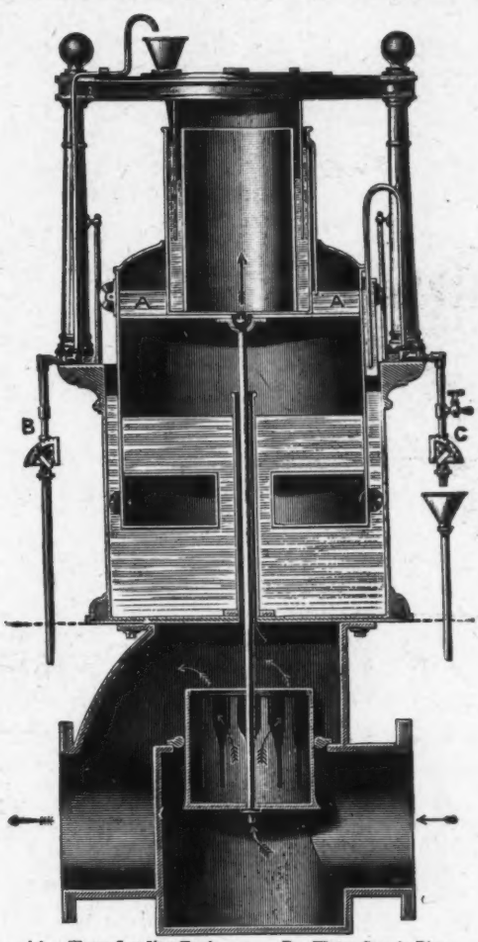
Printed (at the Chancery Lane Printing Works, Ltd.) for Walter King, Publisher, No. 11, Bolt Court, Fleet Street, London, E.C.4.—Tuesday, March 26, 1918.

COWAN'S GAS GOVERNOR

This Governor is a perfect regulator of gas pressure. Unaffected by **even the most extreme and sudden changes of inlet pressure or of draught,** it maintains, without variation, the pressure it is adjusted to give.

This result is attained by balancing the influence of the inlet pressure on the valve-base by an equivalent force, operating *above the roof of the bell.*

Another and a great advantage is the **unique water-loading arrangement,** which is made perfect and complete by the use of **WM. COWAN'S "STATIONARY SYPHON."**



AA.—Water-Loading Tank. B.—Water-Supply Pipe.
C.—Water-Withdrawal Syphon.

The water loading is further utilized to maintain automatically the depth of the "seal" in the compensating slide. While the loading is going on, the water is first delivered into the slide, from which it overflows into the loading tank below.

We have supplied these Governors to many of the most important Gas-Works in the United Kingdom and abroad, to the Engineers of which we shall have pleasure in referring those who may favour us with inquiries.

W. & B. COWAN

INCORPORATED IN

Parkinson and W. & B. Cowan, Ltd.

FITZALAN STREET WORKS, KENNINGTON ROAD, LONDON, S.E. 11.

Dalton Street Works, Newtown, **MANCHESTER**; Buccleuch Street Works, **EDINBURGH**; The Glasgow Meter Works, 57, John Street, Bridgeton, **GLASGOW**; Hill Street Works, **BELFAST**; Commonwealth Meter Works, Macquarie Place, **SYDNEY**; 56, a'Beckett Street, **MELBOURNE**; Duncan Street, Fortitude Valley, **BRISBANE**; Ballance Street Works, **WELLINGTON, N. Z.**

THE GAS METER COMPANY, Ltd.,

Manufacturers of

GAS METERS OF ALL KINDS.

Consumers' Wet, Dry, Ordinary or Prepayment Meters, Station Meters, Governors, Gauges, Testing Apparatus.

SIXTY Years' reputation for quality of materials and workmanship still maintained.

LONDON.	OLDHAM.	DUBLIN.	MANCHESTER.
HEAD OFFICE & WORKS.	WORKS.	WORKS.	WORKS.
Letters: 238, Kingsland Road,	Union Street,	Hanover Street,	18, Atkinson Street,
Telegrams: "Meterphone, London."	"Meter, Oldham."	"Meter, Dublin."	"Meter, Manchester."
Telephone: Dalston 142.	Oldham 340.	Dublin 1995.	Central 2918.

PUMPS FOR COKE OVENS.

QUENCHER PUMPS.

Specially designed for pumping water containing grit.

Write for List No. 770.

Pulsometer Engineering Co., Ltd.

11, Tothill Street, Westminster, S.W.

Nine Elms Ironworks, Reading.

GASHOLDER PAINTS.

Purest of the Pure. Best of the Best.

LASTING POWER GUARANTEED EQUAL TO THE DEAREST PAINT QUOTED.

TRADE MARK "SHELL" BRAND REGISTERED.

ENAMELS FOR GAS METERS.

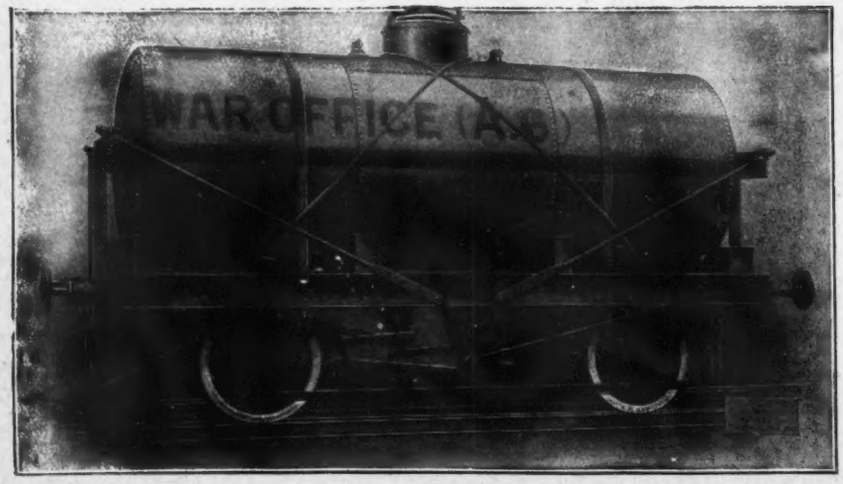
ENAMELS (*Special for Outside Wear*) **FOR GAS LAMPS AND STANDARDS.**

GASTITE for Gas Joints. Up-to-Date Economy.

LUTE BLACK FOR PURIFIERS AND THE INSIDE OF IRON TANKS.

SOLE MAKERS—

ARCHD. H. HAMILTON & CO., POSSILPARK, GLASGOW.



MAKERS OF

RAILWAY TANK WAGONS

and

Railway Rolling Stock

Of every Description.

For SPECIFICATION and PRICES apply to the

Midland Railway Carriage and Wagon Co., Ltd.,

Midland Works, BIRMINGHAM.

Telegraphic Address: "Wagon Birmingham." Telephone Nos. 483, 484, & 485 East (3 lines).

London Office: 14 Victoria Street, Westminster, S.W. 1.

Telephone: 3371 Victoria. Telegrams: "Underframe, Vic. Ldn."

Printed (at the Chancery Lane Printing Works, Ltd.) for Walter King, Publisher, No. 11, Bolt Court, Fleet Street, London, E.C. 4.—Tuesday, March 26, 1918.